

ABSTRACT

OF

The Proceedings of the Association of
Life Insurance Medical Directors of
America for the Twenty-eighth
and Twenty-ninth Annual
Meetings

1917-1918

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THE ASSOCIATION OF LIFE INSURANCE
MEDICAL DIRECTORS OF AMERICA

Compiled by the Secretary
by
Order of the Association

An Abstract of the Proceedings
OF THE
Association of
Life Insurance Medical Directors
of America.

TWENTY-EIGHTH ANNUAL MEETING.

The Twenty-Eighth Annual Meeting of the Association of Life Insurance Medical Directors was held in the Board Room of the State Mutual Life Assurance Company, Worcester, Mass., on October 17 and 18, 1917. President Homer Gage in the chair.

Roll-call showed a quorum present. The following members were present at some time during the sessions:

Dr. H. B. Anderson
" Wm. Armstrong
" W. B. Bartlett
" W. W. Beckett
" L. D. Chapin

Dr. C. L. Christiernin
" Henry Colt
" H. W. Cook
" E. W. Dwight
" O. M. Eakins

2 Twenty-Eighth Annual Meeting

Dr. Z. Taylor Emery	Dr. O. H. Rogers
" John W. Fisher	" E. K. Root
" Homer Gage	" W. W. Rose
" F. L. Grosvenor	" R. L. Rowley
" George C. Hall	" H. C. Scadding
" J. B. Hall	" S. B. Scholz, Jr.
" W. F. Hamilton	" Morton Snow
" W. G. Hutchinson	" G. S. Stebbins
" W. A. Jaquith	" Harry Toulmin
" A. S. Knight	" G. A. Van Wagenen
" R. L. Lounsberry	" Wm. R. Ward
" H. A. Martelle	" J. H. Webb
" L. F. MacKenzie	" W. H. Wehner
" T. F. McMahon	" F. S. Weisse
" John C. Medd	" F. C. Wells
" W. D. Morgan	" F. L. Wells
" W. Muhlberg	" C. D. Wheeler
" R. B. Ober	" T. H. Willard
" Herbert Old	" M. C. Wilson
" S. H. Parker	" Glenn Wood
" Wm. Evelyn Porter	" A. B. Wright

The total attendance at all sessions was 52.

President Wright, of the State Mutual Life Assurance Company, in the following brief address, welcomed the members of the Association:

President Wright—Mr. Chairman and Gentlemen:
In coming to Worcester for this meeting of your Association, we feel that you have done both the city and this Company a very great honor, one that makes us feel justly very proud, and my associates

here join me in extending to you a very cordial welcome to our Home Office. The work of your Association, what it is doing for life insurance, as well as its value to the general medical profession and to the cause of humanity, is well recognized, and with your very full program, extended comment from me regarding it would only be an encroachment on your time. While you are in the city, if we can be of any service to your Association or to you individually, I hope you will have no hesitation in calling upon us, as we should consider it a privilege to be of some service to you, and we hope you will give us the pleasure of lunching with us to-day and to-morrow, and meet the officers of the Company. Luncheon will be served at about one o'clock on the upper floor of this building, where we hope to see you all.

The names of the following candidates for membership recommended by the Executive Council were presented:

Dr. Donald M. Gedge, Assistant Medical Director, Metropolitan Life Insurance Company.

Dr. Samuel W. Means, Assistant Medical Director, Metropolitan Life Insurance Company.

Dr. Chauncey R. Burr, Assistant Medical Director, Metropolitan Life Insurance Company.

Dr. Morton Snow, Medical Director, Massachusetts Mutual Life Insurance Company.

Dr. E. H. Allen, Assistant Medical Director, John Hancock Mutual Life Insurance Company, of Boston.

4 Twenty-Eighth Annual Meeting

Dr. I. Haines, Assistant Medical Director, John Hancock Mutual Life Insurance Company, of Boston.

Dr. S. B. Scholz, Jr., Medical Director, Missouri State Life Insurance Company.

Dr. A. H. Gordon, Chief Medical Referee, London & Lancashire Life and General Assurance Association.

Dr. John W. Abbott, Medical Director, Germania Life Insurance Company.

Dr. O. M. Knox, Medical Director, North American Life Insurance Company, Chicago, Illinois.

Dr. Arthur H. Griswold, Assistant Medical Director, Phoenix Mutual Life Insurance Company.

Dr. J. L. Larway, Assistant Medical Director, State Life Insurance Company, of Indianapolis.

Dr. O. F. Maxon, Medical Director, Franklin Life Insurance Company.

Dr. H. B. Anderson, Chief Medical Referee, Imperial Life Assurance Company.

Dr. John Ferguson, Medical Director, Excelsior Life Insurance Co.

Dr. G. V. Woollen, Medical Director, American Central Life Insurance Company.

Motion was made and carried that the Secretary be instructed to cast a ballot in favor of each of the names recommended by the Executive Council. The Secretary announced the ballot so cast, and the candidates were declared elected. Two of the newly elected members, Dr. Snow and Dr. Anderson, were escorted into the room, and introduced by Dr. Dwight and Dr. McMahon.

On motion, the reading of the minutes of the last Annual Meeting was waived.

The Secretary then read the minutes of the meetings of the Executive Council held on October 26, 1916, December 13, 1916, March 29, 1917, and October 16, 1917. On motion these minutes were approved as read.

Dr. Jaquith took the chair while President Gage read the following address:

ADDRESS BY THE PRESIDENT—DR. HOMER GAGE.

Being somewhat of an antiquarian I have been looking back over the earlier records of this Association, and knowing that according to the custom which has prevailed since I was permitted to have a share in your deliberations, the President was expected to say something by way of introduction, I was interested to look up the matter of Presidential addresses.

I was surprised to find that until the sixth annual meeting there is no record that any such address was delivered; and that with the exception of Dr. Edgar Holden's two addresses in 1895 and 1897, none appear in our published transactions until that of Dr. Rogers in 1907.

Since then the custom has been invariable, and although deeply conscious of my own disqualifications I venture to ask you to give attention for a few moments to a few very brief observations on the evolution of Medical Selection, with a single illustration of the application of modern insurance methods to the study of a clinical problem.

In the first address by Dr. Holden he said "that in the old days of the London Equitable the applicants came personally before the directors, and after a period of probation were accepted or declined,—now the ubiquitous solicitor spreads his silken net and the directors trust to the examiners to sort the contents."

In the early days of our own company applicants did not

6 Twenty-Eighth Annual Meeting

have to present themselves—they simply presented a formal application with a certificate of health from their family physician; these were passed upon by a committee of the directors who met once a week in the evening at seven o'clock; and I have often heard my father say that even after he became a Medical Director in 1865, the physical fitness of the applicant and his medical history were quite subordinate to the consideration of his general character, reputation, and financial responsibility. So that the selection of lives was conducted very much as the dissection of character in the sewing circle of the village church.

Gradually it came to be recognized that the problem was largely a medical one, and that the medical examination and medical history of the applicant and his family were the important factors in determining his insurability. The responsibility for the selection of lives then fell upon the shoulders of the Medical Director. But for many years his method of dealing with the problems, reflecting as it did the general attitude of the profession toward medical questions, was little better than the old way.

As a physician engaged in general practice he had certain preconceived notions and prejudices about health and disease and their relations by which he was very largely influenced in selecting lives for insurance.

It could not be expected that he could divorce himself from the attitude of "the old-fashioned consultant" with whom Dr. Russell frankly classed himself as late as 1897, who, when his opinion was asked, quietly commenced by saying that "my experience has been so and so, and I have found such and such remedies produced best results, and very likely ended the matter by relating a case that occurred many years previously"—an opinion that was based upon an experience which was never analyzed, and a memory that was impressed chiefly by his successes, and conveniently forgot his failures, or attributed them to some unlooked for or not to be expected complication, which in no wise altered or impaired the value of his conclusion.

It was a long and difficult process to overcome the mystery, superstition, and ignorance with which the problems of life and death were regarded by the profession as well as by the laity.

Philosophical reasoning instead of the accurate observation of facts was the weapon used by the defenders of each successive theory of disease from the humoralists down.

Discarding all theories and seeking only to discover the demonstrable facts of anatomy, comparative anatomy and the anatomy of disease, John Hunter in the last years of the eighteenth century, without attempting to establish any new system of medicine, was among the very first to emphasize the importance, in the study of medical problems, of using scientific methods founded upon the accurate observation of indisputable facts.

Perhaps the next most important step in the search for the truth about disease was the work of Louis in Paris during the early part of the nineteenth century—Louis devoted himself at La Charité for many years "to simple observation, without the distraction of medical practice and without having any share in the treatment of the cases under his observation." "When he had accumulated a great mass of cases he arranged the facts he had collected in a tabular form to facilitate a comparison of them."

He thus gave the first great impetus to the numerical method as applied to the study of disease. Under such leadership scientific study gradually led to the differentiation of diseases and a more accurate knowledge of their natural history,—to the recognition that some were self limited by nature, so long as they were not aggravated by treatment, while others were naturally and inevitably progressive, and that all were associated with certain definite organic changes.

Then came the discovery of cellular pathology, the study of bacteria in their relation to the cause of disease, leading to the birth of preventive medicine.

Altogether a program of progress, which while very far from being final or complete, has placed medicine and surgery

on a firm scientific foundation, from which further progress may be expected, but from which it is not likely to be dislodged.

The cancer problem, the problem of natural and acquired immunity, and the effects of diet, occupation, and environment upon health, as well as the great problem of life itself, are still unsolved; but it seems quite obvious that they can be solved only by the scientific study and compilation of accurately and carefully observed facts.

I have referred thus briefly to the growth and development of medicine and surgery as a new science, because as a result of it and by a very similar process has come the growth and development of the medical selection of lives for insurance from pure empiricism to a reasonably accurate scientific accomplishment.

The older medical directors had as a basis for their action only the theories, impressions, and prejudices which were derived from a personal experience that was not a matter of record but of memory. That they succeeded so well in maintaining a low mortality is the strongest evidence of their sagacity and good judgment.

But when the clinician with his new methods and more accurate knowledge of the phenomena of disease began the study of its causes, and the means of arresting and preventing it, the medical director saw the still larger problem of its effect upon longevity as well as the effect of heredity, occupation, and build, and it was very natural that in the study of this problem his attention should first be directed to the study of mortality statistics.

It was a step forward, because it substituted exact knowledge for unconfirmed impressions. It showed that by far the greatest mortality was due to tuberculosis, and that this mortality was chiefly among the younger entrants and the underweights. It disclosed the relative importance of other diseases as reflected in our death claims, and must be acknowledged to have made our selection a little less empirical. It certainly helped to show the directions in which our selection was too liberal.

But as a scientific basis for estimating the insurance value of a given life it failed utterly, because it did not take into account the number of similar lives at risk, and therefore gave no information as to the mortality that might be expected in a given class of cases from all causes.

The way to remedy this defect and to supply the information needed was found in the study of insured lives arranged as nearly as possible in homogeneous groups,—a method which received its first notable application in the Specialized Mortality Investigation of the Actuarial Society in 1903. This had been preceded in 1901 by a notable paper by Dr. Rogers read at the twelfth annual meeting of this Association on "Build as a Factor Influencing Longevity," in which he presented a study of 1553 lives of persons, 35% or more overweight, and of 9006 persons, 13% or more underweight.

These were studied as a whole, with mortality experiences in lives and in amounts, and then subdivided into smaller groups according to age at entrance, and to variations from the normal weight.

This and two papers presented in 1906 and 1907 in further elaboration of the same method of study and investigation by Dr. Rogers mark, it seems to me, the beginning of a new and more scientific method of medical selection, which up to the present time is best illustrated by the table of the Medical Actuarial Investigation.

This method has beyond question established a solid foundation upon which a scientific selection may be based. Many of the groups which have been studied are now pretty conclusively standardized, and the principles underlying the method seem thoroughly sound.

There are, it seems to me, but two important defects which it should be our business to correct. First, many of our groups are still too small, so that accidental variants assume an importance greater than they deserve.

Time will remedy this if the companies will only continue to analyze and compile statistics, and we can make our results more accurate and more valuable just in proportion as we are

10 Twenty-Eighth Annual Meeting

able further to subdivide our classes so as to make the groups more perfectly homogeneous.

Second, it must be remembered that our study is so far confined to lives already selected, and the results are therefore more or less modified by the personal equation of the Company and its medical director.

It would be very helpful to us and of invaluable benefit to the public, whose servants we are, if we could extend this study to large groups of unselected lives, especially those subject to a previous physical impairment, remembering always that the value of the results is in proportion to the homogeneity of the groups studied.

The first step toward this desirable object was taken at our last meeting, when Dr. Charles H. Mayo's cordial invitation to inspect and analyze the records of the Mayo Foundation in certain classes of cases, was extended to this Association; and its further accomplishment made possible by the kindness of Mr. Hunter, in volunteering to conduct the inquiry.

I know that he had hoped to be able to present a preliminary report to-day, and that it is not through any lack of zeal and hard work on his part that the report is not ready. We look forward to it with the deepest interest, not only because we believe it will be of great assistance to us in the routine work of our offices, but because it represents the first application of our statistical methods to the broader problem of disease and its effects upon health and longevity.

During the past year I have been reviewing, as I mean always to do from time to time, some of my own cases with a view to ascertaining as nearly as possible my end results; and I selected for the purpose my operations for the removal of fibroid tumors of the uterus, including all of those done prior to January, 1916.

After I had gotten my statistics together in their usual form, I thought it would be interesting to see how they would look translated into insurance language, and I ask your indulgence for presenting them here. I do it with some hesitation, because I am fully aware that the subject is not one of great

insurance interest, although I am not aware of any attempt to establish its value as an element in the insurance risk.

Furthermore the cases are too few in number to be at all conclusive, and the number untraced is so large that their value is still further impaired.

They do however constitute a class as large as some of those contained in the Medical Actuarial Report, and what is of most importance, they illustrate, as I have never seen illustrated before, the way in which medical statistics may be made of greatest value, not only in determining the end results of treatment, but also in assisting us as medical directors in estimating the importance of a previous history of disease or surgical operation in medical selection.

I present these figures then because they give us some index, more than we have had I think, of the effect of uterine fibroids on insurance values, and in the hope that they may stimulate others more competent than I, to apply this method to the study of their medical statistics and problems.

The actuarial part of the work has been very carefully done by Mr. Fitzgerald, our actuary, to whom I am very much indebted for his interest and assistance.

The cases investigated number 275 and are distributed in regard to year of operation as follows:

Year.	Number of Cases.	Year.	Number of Cases.
1893	1	1905	19
1894	4	1906	15
1895	1	1907	14
1896	2	1908	17
1897	1	1909	13
1898	2	1910	13
1899	6	1911	14
1900	23	1912	9
1901	22	1913	15
1902	19	1914	19
1903	10	1915	24
1904	12	1893-1915	275

12 Twenty-Eighth Annual Meeting

We have 45 cases whose information is incomplete—whether individual is alive or dead. These we have had to discard entirely. We have 41 deaths—of these we have three where age at time of operation has not been stated. We have 189 cases now living and in two of these cases age at time of operation has not been given.

In the three cases of death and two among those living where age at operation is not stated, we have assumed the average age of 43, obtained from the remaining 38 deaths and 187 living. This is obtained as follows:

	Number.	Sum of Ages.	Average Age.
Died	38	1747	46
Living	187	7883	42
	225	9630	43

Of the forty-one who have died, we have the following information as to their deaths:

Time of Death.	Number.
Died in hospital.....	5
Died same day.....	1
Died next day.....	1
Died two days after.....	2
Died four days after.....	1
Died five days after.....	1
Died eleven days after.....	1
Died soon after leaving hospital.....	1
Died two months after leaving hospital....	1
Died four months after leaving hospital...	1
Died six months after leaving hospital....	2
Died nine months after leaving hospital...	1
Total number.....	18

Here we have twenty-three deaths where death took place a year or more after operation.

We have no information as to the exact date of birth. Here we have assumed that each case is the exact stated age at date of operation.

We have year of death only given and have assumed that the death took place on the anniversary of operation. In the cases of those living, the exposure has been taken to anniversaries in 1916 of the date of the operation. These assumptions have rendered it a simple process to deduce the exposures at each age since only integral exposures are involved.

When the exposures are taken from the time of operation, we have 1715 years of exposure or on an average slightly more than eight years of exposure for every life involved ($189 + 23 = 212$).

We have taken the expected deaths on the basis of the American Table and also on the basis of the Medico-Actuarial Ultimate Table.

We have also taken the exposures dating from two years after the date of operation, and in so doing we eliminate five deaths which take place within the first two years after operation and we thus reduce the exposures to 1315 with an average of slightly less than eight years for each life involved ($148 + 18 = 166$).

A comparison of the actual and expected deaths gives the following results:

Experience	Number of Deaths	Percentage of Actual to Expected Deaths.	
		American Table.	Medico-Act.
From date of operation....	23	83.62	121.65
From two yrs. after operation.....	18	81.09	116.26

Here we have a group of "unselected" lives, *i.e.* unselected from an insurance point of view. There is, however, on the

14 Twenty-Eighth Annual Meeting

whole a species of selection in that in the greater number of the cases the individuals are in good circumstances and have in consequence proper medical attendance, nursing, good food, and the best of care, and they would probably in this respect be similar in quality to the insured lives after five years of insurance, who have a history of having had a major operation, as in Classes 63-67, Medico-Actuarial Investigation.

This group in the Medico-Actuarial experience was so small that it was not analyzed. The percentage of actual to expected was 139% as compared with 122% and 116% in our experience.

In the Medico-Actuarial experience the deaths number 17 as compared with 23 and 18 in our experience and the lives entering 243 as compared with our 212 and 166.

ACTUAL TO EXPECTED DEATHS.

Exposures Taken from Two Years from Date of Operation.

Age	Exposed to Risk	Deaths	Expected Deaths	
			American	Medico-Act.
28	1		.008	.005
9	5		.041	.024
30	5		.042	.025
1	7		.060	.034
2	9		.079	.044
3	12		.107	.060
4	16		.146	.080
35	18		.167	.092
6	22		.209	.114
7	26	I	.252	.138
8	31		.307	.167
9	32		.324	.176
40	46		.477	.262
1	48		.509	.283
2	54	I	.588	.335
3	52	I	.585	.343
4	57		.667	.399
45	59		.720	.442
6	60		.770	.480
7	74		1.000	.629
8	69	I	.984	.628
9	73	I	1.099	.715
50	65		1.036	.689
1	62		1.048	.713
2	54	I	.969	.675
3	52	I	.993	.702
4	44		.894	.642
55	40	I	.867	.632
6	37	I	.856	.633
7	32		.790	.592
8	27	I	.712	.543
9	23		.650	.504
60	18	I	.546	.432
1	17	I	.554	.449
2	14	2	.492	.407
3	11		.416	.353
4	9	I	.367	.319
65	8		.353	.312
6	6		.286	.257
7	4		.206	.188
8	4		.223	.206
9	4	I	.240	.226
70	4	I	.260	.247
1	2		.140	.134
2	1	I	.076	.072
73	1		.082	.078
	1315	18	22.197	15.480

81.09%

116.26%

ACTUAL TO EXPECTED DEATHS.
Exposures Taken from Date of Operation.

Age	Exposed to Risk	Deaths	Expected Deaths	
			American	Medico-Act.
26	2		.016	.010
7	5		.040	.024
8	5		.041	.024
9	8		.066	.039
30	11		.093	.054
1	13		.112	.064
2	18		.157	.088
3	18		.161	.090
4	26		.236	.130
35	31		.288	.158
6	36		.342	.187
7	40	I	.387	.212
8	54		.535	.292
9	56		.567	.308
40	62		.642	.353
1	68	I	.722	.401
2	70	2	.763	.434
3	75	I	.844	.495
4	77		.901	.539
45	85		1.038	.637
6	85	I	1.091	.680
7	86		1.162	.731
8	82	I	1.169	.746
9	87	2	1.310	.853
50	80		1.275	.848
1	73		1.234	.839
2	64	I	1.149	.800
3	62	2	1.184	.837
4	52		1.056	.759
55	44	I	.953	.695
6	38	I	.879	.650
7	33		.814	.610
8	28	I	.739	.563
9	25		.706	.548
60	20	I	.607	.480
1	19	I	.620	.502
2	15	2	.527	.436
3	12		.454	.382
4	10	I	.408	.354
65	9		.397	.351
6	7		.333	.300
7	4		.206	.188
8	5		.278	.258
9	5	I	.300	.283
70	4	I	.260	.247
1	3		.211	.200
2	2	I	.152	.145
73	1		.082	.078
	1715	23	27.507	18.002
			83.62%	121.65%

In review of these figures it will be seen that the operative mortality was about $4\frac{1}{2}\%$, that there was an additional mortality during the first year of almost $2\frac{1}{2}\%$, and during the second year of almost 2% . These later deaths may or may not have been the direct result of the operation,—those deaths occurring in the second year could hardly be included in the operative mortality; but we have made up a table excluding them to show the effect of using a two-year-after-operation basis, in the selection of lives with this impairment.

So far as our figures go they indicate that after two years the extra hazard due to this operation is not great. I wish the evidence were more conclusive, but the foundations of our selection must be built up stone by stone, and each stone, though quite unimpressive and unimportant by itself, contributes its bit to the perfect structure.

The President again took the chair, and the Secretary read the following proposed amendment to the Constitution:

PROPOSED AMENDMENT TO ARTICLE IV OF
CONSTITUTION.

That Article IV of the Constitution be amended as follows:

“Strike out the word ‘and’ before ‘a Treasurer’ and add the words ‘and an Editor of the Proceedings,’ so that Article IV shall read as follows:

“The officers shall consist of a President, a first and second Vice-President, a Secretary, a Treasurer, and an Editor of the Proceedings.”

Moved by Dr. Rogers and seconded by Dr. Willard that the amendment to Article IV of the Constitution be adopted. Motion was carried.

Balloting for nomination of officers was next in order and Drs. Rowley and Hall were appointed tellers and distributed the ballots.

The Treasurer's report was read by Dr. A. S. Knight and referred to Doctors McMahon and Colt as Auditing Committee.

Dr. O. H. Rogers then presented the report of the M. I. B. Committee. On motion, the report was accepted with thanks.

The Secretary read a communication from Mr. John K. Gore, Vice-President and Actuary of the Prudential Life Insurance Company, reporting on behalf of the Joint Committee continuing the work of the Medico-Actuarial Investigation, with reference to the question of build, as follows:

The Committee's first object was to provide a set of mortality ratios, expressed as a percentage of normal mortality, that would indicate the probable future experience on risks whose weight varied from the average in either direction.

On pages 23 and 24 of Volume II of the Medico-Actuarial Investigation Report, tables of the nature indicated were supplied, but it was felt that these tables were not in the most convenient shape for practical use and did not distinguish between tall men, men of medium height, and short men, respectively. A further point against the use of these tables unmodified was that they represented the experience as it was tabulated, and consequently included relatively little experience for the longer durations and none at all after the twenty-fourth policy year.

The Committee has prepared new tables, using the data underlying the tables above referred to after adjustment to allow proper weight for the various years of insurance. A quantity of additional material also was furnished by several

companies for the use of the Committee. These new tables show for quinary or smaller entry age groups mortality ratios for men of medium height, for short men, and for tall men, respectively, mortality ratios according to the extent of departure from normal weight, the variation being stated both in the form of the absolute number of pounds departure and also, in separate tables, as a percentage of the normal weight. Thus for the entry age groups 20-24, 25-29, 30-34, etc., we have mortality ratios for persons from forty pounds underweight to seventy-five pounds overweight proceeding by intervals of five pounds and from 30% underweight to 40% overweight proceeding by intervals of 5%.

These ratios are intended to be regarded as averages for all durations. Thus a ratio of 150% does not mean that the expected mortality in the group in question remains constant at 150% of the normal for all policy years, but may commence at, say, 120% and rise with increasing duration to 180% or 200%; or it may commence at 200% and fall to normal. The general rule is that overweights are better in the early policy years than their average and worse in the later, while the reverse is true of underweights.

Because of the feature just named the Committee has prepared mortality ratios among overweights which would correspond to the expected experience during fifteen or twenty years after entry, the resulting ratios being smaller than those for all policy years. These ratios are offered with certain comments as to the implications their use would involve.

The Committee has taken care to point out that, as the data upon which their tables are based were derived from lives which were substantially free from blemish apart from the question of weight, the ratios supplied do not apply to risks which in addition to abnormal weight show impairments affecting their prospects of longevity.

As to the progress of the work of the Joint Committee, I might say that the report on this part of the investigation has been set up in type and first proof for revision by the members of the Committee will be ready in a few days.

20 Twenty-Eighth Annual Meeting

President Gage announced that this communication was in the nature of a preliminary report, that the final report would follow, and that no action on the preliminary report was necessary at present.

Motion was made and carried that the Secretary send a letter of thanks to Mr. Gore for his work in preparing this preliminary report on build, representing as it does a great deal of labor.

Dr. E. W. Dwight, in presenting the report on Nomenclature of Urinary Impairments, said:

In asking me to read this report, I am being punished for the fact that I have not attended the meetings of the Committee, and I have really little knowledge of what is contained in the report. This does not mean that I have not been interested, but I have been able to do little more than my regular work on account of the condition of my eyes. I have, however, read the report sent to me by Dr. Daley, and I have expressed to him my approval of his report.

Dr. Dwight then read the report of the Committee on Nomenclature of Urinary Impairments, as follows:

Agreeable to the resolution passed at the last meeting of the Medical Directors Society, the Committee on Nomenclature of Urinary Impairments have modified their original report and beg to submit the following:

The corrections made consist in rewriting the first paragraph and adding to the paragraph marked "Casts" the words "Containing no more than two drops of the sediment."

Respectfully submitted

J. B. OGDEN

E. W. DWIGHT

AUGUST B. HOBBS

J. ALLEN PATTON

ROBERT M. DALEY, *Chairman*

The object of this Committee is to arrive at an exact definition of certain of the commoner terms used in describing the results of urinalysis. It has confined itself solely to terminology. The significance of abnormal constituents of the urine not being within its scope. It recommends that wherever possible, exact numerical terms be used but where this is not done and any of the expressions hereafter described are used, these expressions be confined to the limits here set forth.

COLOR—ODOR—REACTIONS.

It is agreed that the nomenclature of the color, odor and reaction of the urine, is not of sufficient value, from a viewpoint of technical differences, to require the attention of the Committee.

SPECIFIC GRAVITY.

It is recommended that the word "normal" as relating to the Specific Gravity of the urine shall refer to urine whose weight is between the limits of 1015 and 1025, inclusive; that the term "persistent high specific gravity" shall refer to urine whose specific gravity is over 1030, and that the term "persistent low specific gravity" shall refer to urine whose specific gravity is under 1012. Urines of specific gravity 1012, 1013, or 1014, may be described as somewhat lower than normal. Urines of specific gravity 1026, 1027, 1028, and 1029, somewhat higher than normal.

It is recommended that the methods of examination of the urine for albumin and sugar, as approved by the Association of Life Insurance Medical Directors in 1908, be considered as standard tests for these substances.

ALBUMIN.

FAINT TRACE.

By Heat and Acid Test.—That amount of albumin which will produce a faint cloud which is transparent and flocculent only

upon the addition of a slight excess of the acid. This cloud is best seen by the use of a dark background.

By Nitric Acid Contact Test.—That amount of albumin which will produce a clean-cut ring of least visibility, when the urine has been in contact with cold nitric acid for a period of at least five minutes by the under-lying method, and up to twenty minutes by the over-lying method, and best seen by use of a dark background.

A VERY FAINT TRACE.

By Heat and Acid Test.—That amount of albumin which will produce a very faint transparent cloud seen only by interposing a dark background obliquely between the source of light and the test-tube.

By Nitric Acid Contact Test.—An amount of albumin less than a faint trace the reaction produced in the manner above described being only faintly visible as a haze or cloud by use of a dark background.

A TRACE.

By Heat and Acid Test.—That amount of albumin which will produce a translucent cloud or coagulum and which is more or less flocculent, depending upon the number of drops of acid used in the test.

By Nitric Acid Contact Test.—That amount of albumin produced in the manner described above, whose ring is distinct and wider than that described as a "faint trace" (about $\frac{1}{16}$ of an inch) and which can be seen through the top of the tube as a translucent zone.

A MODERATE QUANTITY OR AMOUNT.

By Heat and Acid Test.—That amount of albumin which will produce an opaque cloud or coagulum, usually flocculent, yet made more so by the addition of a slight excess of acid.

By Nitric Acid Contact Test.—That amount of albumin pro-

duced in the manner above described, whose ring shall be of distinct width (approximately $\frac{1}{8}$ inch in thickness) and which can be seen through the top of the tube as an opaque zone, and flocculent in appearance.

A LARGE QUANTITY OR AMOUNT.

By Heat and Acid Test.—That amount of albumin which will produce a very dense coagulum, which in exceptional cases may become solidified upon continued boiling. The coagulum is usually flocculent in appearance even without any excess of acetic or nitric acid.

By Nitric Acid Contact Test.—That amount of albumin produced in the manner described above, whose ring is more than $\frac{1}{8}$ inch in thickness and whose zone is opaque.

SUGAR.

FAINT TRACE.

That amount of sugar that will reduce 5 c.c. of the diluted Fehling's as described in the test when more than 15 drops of urine are required to reduce the Fehling's solution or when equal volumes of urine and the diluted Fehling's are used that will produce a faint deposit of the suboxid of copper in the bottom of the test tube after the test has stood for several hours, $1\frac{1}{2}$ to 2 hours. This is equivalent to less than $\frac{1}{2}\%$ by the titration method.

TRACE.

That amount of sugar that will reduce 5 c.c. of the diluted Fehling's as described in the test when 11–15 drops of urine are required to reduce the Fehling's solution or when equal volumes of urine and the diluted Fehling's are used that will produce a precipitate of the suboxid of copper which makes its appearance in from five minutes to one-half hour. This is equivalent to about $\frac{1}{2}\%$ by the titration method.

MODERATE AMOUNT.

That amount of sugar that will reduce 5 c.c. of the diluted Fehling's as described in the test when 6-10 drops of urine are required to reduce the Fehling's solution or when equal volume of urine and the diluted Fehling's are used that will produce a precipitate of the suboxid of copper appearing in from two to five minutes' time. This is equivalent to about 1% by the titration method.

LARGE AMOUNT OR QUANTITY.

That amount of sugar that will reduce 5 c.c. of the diluted Fehling's as described in the test when 1-5 drops of urine are used or when equal volumes of urine and the diluted Fehling's are used that will produce a precipitate of the suboxid of copper within one minute's time. Usually this reaction is almost instantaneous. This is equivalent to over 1% by the titration method.

MICROSCOPICAL.

The sediment of about 15 c.c. of urine centrifuged for 3-5 minutes at a rate of 1500-2000 revolutions per minute or about 30 c.c. sedimented by gravity at least 12 hours shall be considered satisfactory.

CASTS.

The sediment of urine as about obtained shall be used as a basis of calculation. The following terms shall convey the number present in one slide containing no more than two drops of the sediment.

Rare.....	1-2
Occasional.....	3-6
Few.....	7-10*
Numerous.....	More than above

RED BLOOD CELLS, LEUCOCYTES, EPITHELIAL CELLS, CRYSTALS.

The sediment of urine as above obtained shall be used as a basis of calculation. The following terms shall convey the number present in one slide.

Rare.....	5-10
Occasional.....	11-20
Few.....	21-30*
Numerous.....	More than the above

Dr. Porter—Mr. President, before recommending the acceptance of the report, I would like to refer to two terms which I consider distinctly bad. First, the term "few" as applying to 7 to 10 casts. There are few of us present here and but a small proportion of our examiners in the field who examine slides and find seven to ten casts in two drops of urine, and yet we use the term here as applying to that number of casts, "few," which to a layman's mind would have a very unfortunate effect. The same would apply, in a less degree possibly, to 21 to 30 pus cells found in a similar amount of urine. In recommending the acceptance of the report, I should suggest and would put it in the form of a motion that the report be accepted with the elimination of the word "few," as indicating these amounts, the report to read, with reference to casts:

Rare.....	1-2
Occasional.....	3-6
Numerous.....	more than above

and with reference to red blood cells, leucocytes, epithelial cells, crystals—

Rare.....	5-10
Occasional.....	11-20
Numerous.....	more than above

Dr. Van Wagenen seconded the motion.

Dr. Gage—I suppose that Dr. Porter is talking about a big slide that covers two drops.

* Later amended and omitted from report.

26 Twenty-Eighth Annual Meeting

Dr. Porter—The variation of the slide makes it a very objectionable procedure, and in order to meet the objections, two drops were specified at the last meeting. Some use a very small slide, not more than a half-inch, others three-quarters, or an inch. I do not care to go into that point as it would lead to a good deal of discussion.

The motion to amend the report by eliminating the word "few" as applying to 7 to 10 casts, or to 21 to 30 red blood cells, leucocytes, epithelial cells, crystals, was carried.

Dr. Porter moved that the report of the Committee on Nomenclature of Urinary Impairments be accepted as amended. Motion seconded and carried.

The Secretary read a report regarding arrangements for the exchange of information with the American Life Convention by the nine companies now members of the M. I. B., who were formerly members of the American Life Convention.

Motion was made and carried that the report be amended by eliminating the word "nine," so that these regulations may be made to apply to all members of the American Life Convention who may ultimately join the Association of Life Insurance Medical Directors.

On motion, the report was accepted as amended.

Dr. W. F. Hamilton read the following memorial of Dr. George Wilkins:

MEMORIAL TO DR. WILKINS.

On the 7th of August, 1916, Dr. Geo. Wilkins, Medical Referee of the Sun Life Assurance Company of Canada, died in Montreal at the full age of seventy-four years, after an illness of several months.

Born in Ireland in 1842, he came to Canada with his parents when but three years of age. His early life was spent in Toronto, attending the Grammar School of that city, and graduating from Toronto University in 1866 with a degree in medicine. He devoted a few years of his early professional life to the office of a ship surgeon in the service of the Allan Steamship Company. After continuing his studies in medicine in New York and London, he was admitted, in 1871, a member of the Royal College of Surgeons of England, and at once began establishing himself in private practice in Montreal.

By his untiring energy, when in the prime of life, Dr. Wilkins carried on a large and exacting practice and at the same time filled several teaching posts, first in the University of Bishop's College and later in McGill University. In Bishop's College he was, at one time, Professor of Pathology. As Professor of Practical Physiology he bore the honor of being at the head of the first laboratory for practical physiological work in Canada. Here he was a pioneer demonstrating his originality in the apparatus adapted for various demonstrations in elementary physiology. In 1882 he was appointed to the Chair of Medical Jurisprudence in the Medical Faculty of McGill University, which he held for twenty years.

He made Histology a practical study. The students, under his direction in the Department of Histology, worked in his own house before the University could afford a laboratory, and studied the specimens which they cut and mounted under his microscopes. His enthusiasm and devotion to this branch of teaching were marked. For many years, beginning in 1876, he enjoyed an alternating six months' service in the Montreal General Hospital. As a teacher of physical diagnosis in the wards of that institution, he excelled and generations of students enjoyed his lectures and demonstrations on pulmonary and circulatory diseases.

The Montreal Medico-Chirurgical Society elected him President in 1897 and as the representative of the Society in that year he took a prominent part in welcoming and entertaining the members of the British Medical Association in its first

meeting outside the British Isles. The Association of American Physicians numbered Dr. Wilkins among its original members.

It is through his offices and work in relation to Life Insurance that Dr. Wilkins is so well known to this Association. From 1906 to 1910 he held office as one of the vice-presidents, and in 1910-1911 Dr. Wilkins was the president of this Association. As one of its members his counsel was often sought both on account of the breadth of his experience and the soundness of his judgment. Dr. Wilkins was devoted to the service of the Sun Life Assurance Company of Canada. Examining in 1871 the first applicant for assurance in that Company, he was made Chief Medical Officer in 1880 and for the remaining thirty-six years of his life, or for forty-five years in all, he was deeply interested in its welfare and consistently zealous for its progress and prosperity. Every member of this body is in accord with the appreciation of Dr. Wilkins expressed in "Sunshine" in about these words: It was good fortune for the Sun Life to have "in its service so skilled a medical authority as the late Dr. Wilkins," and to him "is due, in no small measure, the exceedingly favorable mortality experience it has enjoyed since its inception."

Whether as teacher in the medical school, as attending physician in the hospital wards, as chief medical officer of a progressive Life Assurance Company, or as a colleague in any relationship, Dr. Geo. Wilkins was always the same strong rugged man of honor, loved by his students and implicitly trusted by a large clientele, as well as by an influential directorate, and now deeply mourned by all who knew him.

Dr. Toulmin—Many of us know of the illness of Dr. Symonds, and I make a motion that we instruct the Secretary to send to Dr. Symonds the regrets of this Association because of his illness, and our hearty wishes for his speedy recovery.

Dr. Rogers seconded the motion, and it was carried. The President instructed the Secretary accordingly.

Mortality Experience—Excessive Weights 29

Dr. Fisher submitted a report on the Mortality Experience with Excessive Weights, Northwestern Mutual Life Insurance Company, as follows:

MORTALITY EXPERIENCE—EXCESSIVE WEIGHTS.

NORTHWESTERN MUTUAL LIFE INSURANCE COMPANY.

The Northwestern Mutual Life Insurance Company was, insofar as I have any knowledge, the first American insurance company to investigate the mortality of insured "excessive-weights." At the annual meeting of this Association, in 1892, I presented the result of an investigation on heavy-weights, issues from the organization of the Company, in 1858, to January 1, 1886, as follows:

<u>Extraordinary Record</u>	<u>Expected</u>	<u>Actual</u>
* Excess 1 to 10 pounds	\$131,422	\$138,678
" 11 to 20 "	87,750	89,150
" over 20 "	92,236	103,000
<u>Usual Family Record</u>		
* Excess 1 to 10 pounds	244,845	283,425
" 11 to 20 "	142,311	202,073
" over 20 "	139,106	258,653
	<u>\$837,670</u>	<u>\$1,074,979</u>
EXCESS		\$237,309

"Extraordinary" means neither parent reported dead under 70.

"Usual" means at least one parent reported dead under 70.

"Expected" is taken at 50% of Table for 1st year of insurance, 75% for next four years, and 90% thereafter.

This is probably higher than the Company's average on acceptable risks.

Taking the "expected" at 80% of Table would show excess of rather over \$250,000 in losses.

In 1899, at the annual meeting of this Association, I presented the data covering the mortality investigation of heavy- and light-weight risks placed on the books of the Company

* (Means from 1 to over 20 pounds in excess of maximum.)

during the years 1886-1895 inclusive. During this period, the Company issued 4,954 policies on the lives of persons whose weight was from 1 to 15 pounds in excess of the maximum, and 916 policies where the weight was more than 15 pounds in excess of the maximum, and 1505 policies in which the weight was one or more pounds below the minimum. The mortality was computed on the remaining issues, covering the 10-year period, consisting of 157,815 policies, and the mortality was computed by the Actuary's Table, taking the full tabular expectation by amounts, with the result that the mortality of the class in which the weight was from 1 to 15 pounds in excess of the maximum, was found to be 20.37% greater than the average mortality of the normal issues mentioned, and in the class where the weight was more than 15 pounds in excess of the maximum, the mortality was 38.67% greater than the normal.

The mortality in the light-weight group was one-half of one per cent. better than the average mortality covering the same period.

None of the above data was recorded in the transactions of this Association. The only reference made to these statistics was by Doctor Rogers in his very instructive paper on, "Build as a Factor Influencing Longevity," read at the annual meeting in 1901. It will be noted that in the earlier meetings, the reports of papers and discussions were very meager.

In addition to the foregoing, the Company computed the mortality on excessive weights on the data furnished the specialized investigating committee, covering the years 1885-1900, on Class 60, Weight A—one parent or both dead below age 70; also Class 62, Weight B—neither parent dead below age 70; and Class 63, Weight B—one parent or both dead below age 70. It will be recalled that Weight A was 30% or more above the average and Weight B from 20 to 30% above the average.

The mortality was computed by the Actuary's Table, full tabular expectation on policies.

Class 60 showed a mortality of 20.27% in excess of the gen-

Mortality Experience—Excessive Weights 31

eral mortality of the Company covering the same period, computed by amounts.

Class 62 gave a mortality of 7.59% below the general average.

Class 63, a mortality of 5.91% above the general average.

There were only 670 policies in Class 60; 3,564 in Class 62; 4,128 in Class 63. Class 61 was not investigated.

It will be recalled, in the specialized investigation, that in both classes Weight A and B, where neither parent had died below age 70, there was a difference in the mortality of about 20% between Class 62 and Class 63, and a difference in the mortality of 30% between Class 59 and Class 60, with about the same per cent. of difference where the mortality was computed by the Medico-Actuarial Table and where it was computed by the specialized committee, demonstrating clearly that with longevity in the family record, the excessive weights will show a better mortality by about 20 to 30 per cent. as compared with risks in which excessive weight is not a family trait.

The Medical department of the Northwestern, since 1885, has laid much stress on the family characteristic element of excessive weights in the acceptance of risks, also habits in the use of stimulants, occupation, environment, etc. We have abundance of evidence, as is shown by the Medico-Actuarial investigation that heavy-weights engaged in the handling, manufacture and sale of alcoholic beverages, show a higher mortality than those of average weight.

In the selection of excessive weights, the Northwestern rather favored the tall than the short overweight, which the Medico-Actuarial data proved to have been an error.

Much of the data furnished by the Company to the Medico-Actuarial committee has been investigated. It was determined that the mortality as shown by the January and July issues, furnished the committee by the Company, was 79% of the Medico-Actuarial Table. The data on next page, relating to excessive weights, may be of interest to the Association:

INFLUENCE OF BUILD ON MORTALITY.

AGES AT ENTRY—20 TO 62 INCLUSIVE.

(Volume ii, page 109, *Medico-Actuarial Investigation*)*Medico-Actuarial Experience with Northwestern Omitted.*

<i>Variation from average weight in pounds</i>	<i>Number Entering</i>	<i>Actual Deaths</i>	<i>Expected Deaths</i>	<i>Ratio %</i>
+35 to +45	49,448	4649	3,532.84	132
+50 to +60	43,190	3446	2,376.05	145
+65 to +80	11,775	1121	675.31	166
+85 and more	1,772	235	105.39	223
Total	106,185	9451	6,689.59	141

Experience Northwestern Only

+35 to +45	4,847	412	342.72	120
+50 to +60	3,227	251	187.11	134
+65 to +80	344	23	19.89	116
+85 and more	3	1	.23	435
Total	8,421	687	549.95	125

Mortality Experience—Excessive Weights 33

HEAVY AND LIGHT WEIGHT CARDS OF THE YEARS 1885-1908, INCLUSIVE, AND JANUARY AND JULY CARDS OF THE YEARS 1885-1900, INCLUSIVE, FURNISHED THE MEDICO-ACTUARIAL COMMITTEE, SHOW THE FOLLOWING RESULTS AS COMPARED WITH THE 43 COMPANIES' TOTALS.

Total—Ages at Entry 20-62 Inclusive.

<i>Variation from Average weight in pounds</i>	<i>Number Entering</i>	<i>Actual Deaths</i>	<i>Expected Deaths</i>	<i>Ratio %</i>	<i>43 Companies' * Totals</i>
-50 and more	104	7	11.10	63	103
-35 to -45	5,871	332	407.88	81	96
-25 to -30	23,976	1,061	1,205.37	88	105
-15 to -20	21,321	763	866.79	88	107
-10	2,666	151	188.02	80	96
-5	2,327	136	171.97	79	97
Average	2,168	129	156.75	82	97
+5	1,742	95	133.67	71	99
+10	1,419	92	105.24	87	97
+15 to +20	2,091	139	174.13	80	104
+25 to +30	1,272	111	115.36	96	113
+35 to +45	4,847	412	342.72	120	131
+50 to +60	3,227	251	187.11	134	144
+65 to +80	344	23	19.89	116	165
+85 and more	3	1	.23	435	223
Total	73,378	3,703	4,086.23	91	
* Total	744,672	41,717	38,038.47	110	

Dr. Rogers—Mr. President and Gentlemen: Before reading the paper prepared for this meeting by Dr. Hunter and myself, I wish to say that I was so much impressed with the paper read this morning by the President, that I want to express my extreme satisfaction with it. Dr. Gage has been so fortunate as to prepare the first really scientific report, so far as I know, of results of operative cases. In both medicine and surgery, in all the range of so-called statistical material, there is nothing that gives us results that we can use in our work. It is a curious thing that neither medicine nor surgery has ever been approached from the point of view of end results, of ultimate

* Heavy figures refer to the results of the 43 companies' investigation.

34 Twenty-Eighth Annual Meeting

mortality ratios. With the physician and the surgeon, satisfactory results have been looked upon as achieved if the patient has recovered from the immediate illness—the ultimate effect of that illness or operation has never been scientifically determined. Dr. Gage is a pioneer in that field, and until his work is imitated in every phase of disease and of operation, medicine and surgery will remain an art and not a science.

I am very sorry that Mr. Hunter is not here to read this paper. It represents our joint contribution, and it is only by reason of the fact that Mr. Hunter is very much crowded with work, not only in our office, but with the activities of the government, that he is not here to read the paper as he ought to be.

Dr. Rogers then read the following paper, entitled, THE EFFECT OF GLYCOSURIA AND OF ALBUMINURIA ON MORTALITY.

BY OSCAR H. ROGERS, M.D., CHIEF MEDICAL DIRECTOR AND
ARTHUR HUNTER, ACTUARY, NEW YORK LIFE INSURANCE CO.

In the Medico-Actuarial Mortality Investigation the results in Classes 5 to 11 of the medical impairments are of little value as guides in the selection of risks:—

Class No. 5 dealt with sugar in the urine. The entire class, 3166 policies, exposed over an aggregate of 17,454 years, showed:

Actual Deaths	Expected Deaths by M. A. Table	Ratio
145	140.8	103%

At the time these risks were accepted, the custom of the Companies was, generally, to decline cases with a history of sugar within two years of application. Sugar found on examination was also a bar to acceptance unless only one out of several specimens showed a trace, and there was no history

of sugar having been found in the past. As all of the cases included in this class were risks accepted as standard lives, it is probable, as was pointed out by the Committee in its report, that the Companies have "expected a mortality very slightly if at all higher than the normal," and that "only a small and carefully selected proportion of the applicants with a history of sugar were accepted." The testimony in this class, therefore, may not be accepted as a guide to the selection of risks in which sugar has been found repeatedly on examination.

Class No. 6. Albumin in the urine without casts. Group K, made up of cases where albumin was found on examination, showed:

Actual Deaths	Expected Deaths by M. A. Table	Ratio
22	16.7	131%

Group A, made up of cases in which albumin had been found within two years, showed:

Actual Deaths	Expected Deaths by M. A. Table	Ratio
30	29.1	103%

In Class No. 7, Albumin without examination for casts, Groups K and A, found on examination, or once within two years of application, showed:

Actual Deaths	Expected Deaths by M. A. Table	Ratio
150	129.2	116%

It is unfortunate that the material in Group K of this class was too scanty to justify publication separately. The entire class included 6312 cases. Of these, there were only 521 cases in which albumin was found on more than one occasion, with 19 deaths, and, as was pointed out by the Committee, the Companies must generally have declined such risks.

Classes 8, 9, 10 and 11. Albumin with casts and casts without albumin, contained too little material to be of any real value.

On the whole, the experience of the Medico-Actuarial

Mortality Investigation in all of these classes, probably represents lives in which albumin or sugar was found but once, and was therefore accidental, and it may be accepted as proven that with several examinations of urine a single showing of albumin or of sugar is of minor importance in a risk unexceptionable in all other respects.

Since the publication of the report of the Medico-Actuarial Mortality Investigation experience, Dr. Ogden has presented to the Medical Directors' Association the experience of the Metropolitan Life Insurance Company in cases in which sugar or albumin had been found on examination. These cases were accepted at the regular rate of premium, some of them even in a superstandard class. The mortality in this experience was generally as good as that among insured as a whole: in fact, in some of the groups it was better. It seems probable that these statistics dealt with cases similar to those of the Medico-Actuarial Mortality Investigation, and did not cover cases in which the albumin or the sugar was constant.

As a result of these investigations, the opinion that neither albumin nor sugar is of marked significance, has found support among those who have not carefully considered the circumstances under which this business was accepted. It is with the object of showing that this opinion is not well-grounded that the experience of the New York Life Insurance Company in several similar groups is now given. The cases included in this study showed either albumin or sugar in two or more specimens. They were insured as substandard risks either by means of liens placed against the policy, by extra premiums, by an advance in age, or by placing the risks in a special class as to dividends. The investigation is by policies, not by amounts insured. It is carried to the anniversaries in 1916 inclusive. The Compound Progressive Table was used in the calculations of the expected deaths. As this table is based upon amounts insured, and as the experience by policies is usually lower than that by amounts insured, the mortality ratios are probably somewhat too low.

Rogers—Glycosuria and Albuminuria 37

CLASS I. ALBUMIN WITHOUT EXAMINATION FOR CASTS.

During the years 1896 to 1899, the New York Life insured about 800 risks in which albumin was found upon examination, but in which no examination was made for casts. The average amount of insurance was small, and there was usually some good reason for not obtaining microscopic examination. There were no other impairments in the risks included in this group, and excepting for Albuminuria, they were on the whole about the average. The following is the experience:

Actual Deaths	Expected Deaths by C. P. Table	Ratio
78	48.5	161%

When the group was subdivided by ages at entry, the deaths were too few to warrant very definite conclusions, but the indications are that Albuminuria is of distinctly greater significance above age 40 than below that age. It is worthy of notice that about 37% of the deaths in this group were due to Bright's Disease, about four times the normal proportion of deaths from that disease.

CLASS II. ALBUMINURIA WITHOUT CASTS.

Group A. Between the years 1896 and 1906 inclusive, about 2100 were insured on plans which placed a lien against the insurance or placed the risks in a substandard class as to dividends. The experience in this group was as follows:

Actual Deaths	Expected Deaths by C. P. Table	Ratio
130	99.3	131%

It was to be expected that the mortality would be better than that in which the urine had not been subjected to microscopic examination. In this group 28% of the deaths were from Bright's Disease, about three times the normal.

Group B. Between the years 1907 and 1915 inclusive, there were insured under policies issued with an advance in

38 Twenty-Eighth Annual Meeting

age or with an extra premium, about 2600 persons. The following are the results:

Actual Deaths	Expected Deaths by C. P. Table	Ratio
60	40.5	148%

Of the deaths in this group, 23% were from Bright's Disease, more than twice the normal. The higher mortality in this group as compared with the preceding, may be due to accidental fluctuation or, what seems more reasonable, to selection against the Company, for it is probable that the anti-selection is greater when an extra premium is used than with a lien.

With a view to studying the mortalities with relation to age, Groups IIA and IIB were combined with the following results:

Ages at Entry	Actual Deaths	Expected Deaths by C. P. Table	Ratio
15-24 Incl.	52	50.1	104%
25-39 "	97	65.1	149
40 & Older	41	24.6	167

The number of cases above age 50 at entry was found to be too few to give any reliable results. The last age sub-division was therefore made to include all persons 40 years of age and over at entry. The impression current among Medical Directors that Albuminuria is less important at the younger than at the older ages seems to be confirmed by these results.

CLASS III.

We found in the material to which we had access a considerable number of cases presenting in addition to the Albuminuria, other impairments such as pyuria, overweight, tubercular family history, occasional alcoholic excesses, etc. We made an attempt to analyze this material but because of its very heterogeneous character, we found it impossible. It is

Rogers—Glycosuria and Albuminuria 39

sufficient to say that there were three outstanding impressions made upon our minds during our study of the material.

First: That albumin with pyuria is a serious impairment.

Second: That albumin occurring in decidedly overweight persons is also a serious impairment.

Third: That the relative mortality increases with age as it does in the case of simple Albuminuria.

Taking the group as a whole, the deaths from Bright's Disease were 31% of the total, and were 72% of the normal mortality under the Compound Progressive Table. Deaths from heart disease were also high, 34% of the normal mortality. It is apparent from these results that some impairments which are associated with Albuminuria are much more significant than if the albumin were not present. Or perhaps we should say that in the case of substandard risks, the presence of Albuminuria suggests a serious impairment of the vitality of the individual.

CLASS IV. ALBUMIN WITH CASTS.

There were about 650 cases in this class with:

Actual Deaths	Expected Deaths by C. P. Table	Ratio
75	30	250%

The deaths from Bright's Disease were 50% of the total. The risks in this class were selected with special care and only the best of them accepted.

CLASS V. ALBUMIN (INTERMITTENT).

This class was very small, due probably to the fact that a number of companies have been accepting these risks on standard plans, while our own Company has placed a rating upon them.

CLASS VI. SUGAR IN THE URINE.

Group A. Simple Glycosuria.

This group includes only cases in which sugar was found on

40 Twenty-Eighth Annual Meeting

more than one examination, and by reason of the small amount of material available, cases that were insured at a rated-up age were included with those in which lien plans were used, or which were placed in a special dividend class. The entire experience between 1896 and 1915 inclusive, 1003 entrants, shows the following results by ages at entry:

Ages at Entry	Actual Deaths	Expected Deaths by C. P. Table	Ratio
15-39	41	24.7	166%
40 & Over	54	20.5	264
Total	95	45.2	210

Thirty-two per cent. of the deaths in this group were due to Diabetes, or approximately 70% of the total expected deaths (C. P.). It is evident that persistent Glycosuria is of greater significance than persistent Albuminuria. Evidently Glycosuria is a more serious impairment at the older than at the younger ages at entry. Much to our regret, the number of cases below entry age 25 was too small to justify further age sub-division. It is significant that there were relatively five times as many cases of Albuminuria under age 25 as there were cases of Glycosuria, while at ages 40 and over, the reverse was true. Between the ages 40 and 49 inclusive, there were relatively twice as many cases of Glycosuria as Albuminuria, and for ages 50 to 60 inclusive, the relative proportion was four times as great.

Group B. Besides the cases of simple Glycosuria, there was a group of cases of Glycosuria in combination with one or more other impairments, including overweight, recent history of inflammatory rheumatism, occasional slight alcoholic excesses, and the like. The material, like that in the case of Albuminuria, was too heterogeneous to warrant an attempt at analysis. In so far as we could judge, it confirmed the findings in the preceding group.

CONCLUSIONS.

The following conclusions may be drawn from the foregoing experience when taken in connection with the results of the Medico-Actuarial Investigation, and those derived from the Metropolitan experience by Dr. Ogden:

First: Cases which show only a trace of sugar or of albumin in the first of several specimens examined at different times, may be looked upon as free from impairment, provided that there is no previous history, and that the risks are first-class in other respects. Care should be taken in such cases, however, to make sure that the applicant, having been aware of his impairment, has not placed himself under treatment before applying for insurance. This is likely to happen in cases which have been declined by another Company.

Second: Cases which show Albuminuria on more than one occasion may not be regarded as standard risks, excepting possibly among the very young, and then only if they are in other respects superstandard risks.

Third: Cases which in addition to Albuminuria present other impairments, should be selected with very great care, and only on terms which provide for a substantial extra mortality. Indeed, the mortality to be expected among certain of these complex impairments, is distinctly higher than the summation of the numerical ratings of the impairments taken independently.

Fourth: Cases that show Glycosuria in more than one specimen have a distinctly higher mortality than similar cases of Albuminuria; and where sugar is persistent, it is undoubtedly a serious impairment, especially at ages of entry above 40.

Fifth: In cases of Glycosuria, the relative mortality appears to be not less at the older ages of entry than at the younger, as has been generally believed, but actually to be greater.

These conclusions apply to the average cases of the type to which they refer, and not to cases that are better or worse than the average. As a rule, the risks were not selected with

greater rigor because of the impairments, but were accepted with about the care usually exercised in the selection of risks. In some classes, as has already been said, the selection has been rather more rigid than the average, but taking the study on the whole, we should say that the risks are about average risks, excepting with respect to the impairment under consideration. No doubt a rather lower mortality could have been secured in most of these groups if the selection had been more rigid. On the other hand, great laxity of selection would have yielded mortalities much above those recorded here. It is believed that the experience here given, taking into account the numbers of cases in the various classes and the duration of their exposure, represents about what may be expected to occur in similar groups in the future.

Dr. Gage—I will ask Dr. Jaquith if he will open the discussion of Dr. Rogers' and Mr. Hunter's most excellent paper.

Dr. Jaquith—We are indebted to the essayists for having presented this extremely interesting paper. Fifteen years ago a paper entitled "Glycosuria and Diabetes in Relation to Life Insurance" was read before the Life Assurance Medical Officers' Association, London, by Dr. Hector MacKenzie. He recommended that if sugar was found only on one occasion and a number of further specimens, obtained without the proponent altering his diet, etc., were free from sugar, then there was no occasion for extra premium, provided the life was not a young one. If, in addition, there was a gouty history or obesity, the life should be accepted only for endowment maturing at or before age 65. The subsequent discussion elicited a variety of opinions; the tendency seemed to be to regard any proponent with temporary or recurrent glycosuria as an impaired life, to be rated up accordingly.

In January, 1914, in discussing a paper entitled "Temporary Glycosuria in Life Insurance," which was read before the same Association by Dr. Otto May, Dr. Cammidge said:

"My firm conviction is that if elementary glycosuria exists you have a person with a defective chemistry, which will probably, as he grows older, become more and more defective. First there is elementary glycosuria, then intermittent glycosuria and then persistent glycosuria. The latter is first of a simple type and later becomes a true diabetes with all the associated secondary disturbances of metabolism."

In the *Archives of Internal Medicine*, June, 1912, vol. ix., pp. 657-664, may be found an article entitled "The Prognosis of Albuminuria with or without Casts" by Theodore B. Barringer, Jr. and Mortimer Warren.

The material analyzed was furnished through the courtesy of Dr. Franklin C. Wells and consisted of 396 men residents of New York City, insured during 1900 and 1901. As far as ordinary physical examination could determine they were normal at that time, excepting for presence of albumin with or without casts. In each case the preliminary examination of the urine was done by the examining physician using heat and nitric acid test for albumin. The findings were always confirmed by an experienced clinical pathologist.

The 396 were divided into three groups—the first, numbering 115, showed albumin without casts; the second group, numbering 203, showed albumin and a few hyaline casts, and the third group included 53 men showing albumin and a few granular casts. During the summer of 1911 seventy of the original men were visited and examined, from 10 to 11 years thus having elapsed since the first examination. Twenty of the men had shown albumin in 1900 and 1901. So far as could be judged, none of the twenty men in 1911 had interstitial nephritis. Twelve were apparently normal as regards heart and kidneys. In eight the urine was found in the same condition as ten years before, excepting that four showed casts in addition. Thirty of the men had shown albumin and casts in 1900 and 1901, one in 1911 had interstitial nephritis, five showed a slightly raised blood pressure, eighteen were apparently normal as regards heart and kidneys and nine showed same condition they did in 1900.

Of the twenty men who had shown albumin and a few granular casts, two had interstitial nephritis in 1911, in five the diagnosis was doubtful, eight were apparently normal as regards heart and kidneys. Considering the entire series of seventy, thirty-eight were apparently free from cardiac and renal disease, three had chronic nephritis and seven possibly had it, two had diabetes and twenty-two still showed the same urinary condition as ten years before, but with no circulatory changes. Of the ten men who had, or possibly had, nephritis, but one was under thirty years of age at the time trouble was first discovered.

Twenty-five of the 396 had died since 1900-1901, four in the albuminuria group, thirteen in the albumin and hyaline cast group and eight in the albuminuria and granular cast group. The expected deaths in the entire group were sixteen and the actual twenty-five, a mortality ratio of 156%. The deaths from nephritis were three times the normal.

"Conclusions:—1. Renal albumin without casts is most frequently found in young adults.

"2. Cases of albuminuria with a few hyaline casts have no particular age incidence.

"3. Those with albuminuria and granular casts show a much higher mortality than normal people and a much greater tendency to renal and arterial disease than either of the preceding groups.

"4. Whatever the urinary findings, age is a factor in the prognosis of albuminuria, young people having the most favorable outlook as regards the possibility of an ultimate nephritis."

Holding the opinion that albumin or sugar found on one examination and not on subsequent repeated examinations was due to temporary causes, our office has accepted applicants belonging to either class, provided, of course, the risks presented no other unfavorable features.

Judging from the mortality ratio in Class 5 and Group A of Class 6, it is probable that only a small and carefully selected portion of the applicants with a history of sugar and albumin

were accepted. Is it not likely that in many instances in Group A of Class 6 the first report of sugar might have been due to wrong interpretation of the reaction obtained in testing for that substance?

The difference between the mortality ratio in Classes 1 and 2, to my mind, quite clearly demonstrates the value of microscopical examination for determining the significance of albumin. I believe we would expect a higher mortality where the albumin has combined with it pyuria or where albumin is present in persons decidedly overweight, as referred to in Class 3. While it is stated that in Class 4 special care was exercised in the selection of risks, the mortality ratio was 250%. It would seem evident that any degree of laxity in dealing with this class will produce an exceedingly high mortality experience. From the mortality ratio shown in Class 6, it is evident that persistent glycosuria is a serious impairment.

Even though repeated examination of the urine shows it to be sugar-free, I am inclined to look with suspicion on a risk recently declined insurance because of glycosuria. We should not lose sight of the fact that under restricted diet sugar can readily be eliminated from the urine. It is our invariable practice in this class of cases to test the urine for acetone.

Dr. Gage—Will Dr. Dwight continue the discussion?

Dr. Dwight—Mr. President and Gentlemen—As is always the case, when a statistical paper comes from the office of the New York Life, it is of great importance, and when written and presented by Mr. Hunter and Dr. Rogers, it is safe to accept the results as near final as these gentlemen are willing to suggest. It would be the height of temerity for me to criticize any results which they have obtained, even if the results of our own Company or my own opinion differed in any sense from theirs, but as a matter of fact, I am impressed in this case, as I have been in every such case, with this fact, that when care-

fully and properly prepared statistics are made, whether by ten men or by two men, in so far as the same points are touched upon, or in so far as the classes are homogeneous, the results will be essentially the same.

As I understand it, Dr. Rogers' and Mr. Hunter's paper is based upon sub-standard lives, cases accepted as sub-standard. One point which they mention is, that the mortality of groups showing more than one impairment is usually greater than the summation of the totals of their impairments. This agrees with our results, and I have one striking example in mind in connection with this subject of sugar. Some ten years ago we made an investigation which showed very unsatisfactory results with the sugars which we had taken. We had tried to take them and had tried to assume that they were no more impaired than those with a history of albumin and albumin with casts and that we could take them in much the same way. We had a mortality for all the sugars of about five times the average mortality of the Company during the same period. We then tried to find out where that mortality came from and among other things subdivided them by weight. We found that where we had a mortality of about 200% by the M. A. table on all sugars, when we included heavy-weights, or rather, eliminated light-weights, we had a mortality of 600%. The groups were rather small, and I suppose it was not actually quite as high, but it was extreme. Another point was that in both these groups the mortality was an increasing one with increasing age.

You are all familiar with the idea of the agents and of the laity generally and also of some doctors, indeed many of our examiners, that albumin and casts in late life do not mean much because so many people have them. My answer to that has always been that it was more common in late life because they are nearer death, but it did not mean that they were any better risks.

I think the paper is extremely valuable as it again calls to our attention the fact that the mortalities in any of these groups depend almost exclusively on methods of selection. I

remember very well a member of this Association who, when I went over with him the first book published, said, "This is fine. Now all we have to do is to accept those who have a mortality of less than one hundred by this table, and decline all those that have more than one hundred. Perfectly simple! I argued with him for an hour or so, and I do not think I impressed him seriously. But that is the great danger of any such series of statistics,—the danger of faulty interpretation. The statements are accurate, the figures are accurate, but their value depends entirely upon interpretation. Badly interpreted, they are much worse than no figures. I had a great deal rather accept a good man's guess-work than a faulty interpretation of the best statistics.

Dr. Rogers' groups refer to sub-standard cases recognized as sub-standard. The M. A. Table represents average groups as selected by the average company and should be accepted as such. Individual experiences of various Companies will vary widely according to their method of selection. Because a group has a high mortality it does not in any sense mean that all the members of that group are bad nor does it mean that they cannot be improved by selection. Dr. Rogers speaks of selection against the company—a very important factor also. We must remember that over-selection is equally important. I have an example in my own company in connection with this question of sugar which shows how far it can be carried. Twelve years ago we investigated sugar and we found that we had a mortality five times as great as our average. Obviously we were entirely wrong. Obviously if we were going to take sugars at all we must select them much more strictly. We proceeded to select them and selected them just as carefully as we could. Caesar's wife had a very doubtful character as compared with the men we selected who had sugar. The result was that for ten years instead of having a mortality five times as high as the average, we had a mortality of about one-third of the average. We took very few cases and they were absolutely perfect in every way. So far as our agents were concerned it was worse than as if we had declined them all because

48 Twenty-Eighth Annual Meeting

we held out a hope and then usually destroyed it. What it meant was, not that we could take them freely but that we could let up a little, and we are. The difference in the mortality of 15% in ten years and 600% previously depended simply upon selection.

The paper also demonstrates again the importance of having groups homogeneous. I am not going further in this connection, as I think I have spoken about it at every meeting, and I know Dr. Rogers has, but I wish I might add a little emphasis to this paper along the ground of the influence of selection and the impropriety of taking any set of figures as being accurate so far as your own Company is concerned until you have investigated your own experience.

Dr. Gage—Dr. Rogers' and Mr. Hunter's paper is now open for general discussion.

Dr. Porter—The conclusions arrived at by Dr. Rogers and Mr. Hunter that cases which showed a trace of sugar or of albumin in one specimen out of several examined at different times is of minor importance is partly borne out by the following statistics.

The Mutual Life has insured during the eight years, from 1907 to 1914, 3,560 cases which showed a history of either sugar, or albumin without casts or albumin without examination for casts. These risks were all accepted on standard rates. These impairments were either found in one out of several specimens on examination or without ten years prior to the date of examination. The experience of these three groups are as follows:

ISSUES OF 1907 TO 1914—EXPOSED TO 1915. ACCORDING TO THE M. A. TABLE.

SUMMARY ALL AGES, POLICY YEARS 1-8						
Class	Medical Impairments	Entrants	Exposures	Act.	Expect.	Ratio
5	Sugar in the Urine-History within 10 years	1,089	3,263	20	23.90	84
6	Albumin in Urine, without casts					
7	Albumin in Urine, no exam. for casts	2,040	5,741	40	32.80	122

We note that Classes 5 and 6, sugar and albumin without casts, show a mortality ratio only slightly in excess of the Company's general experience for the same period which was 71.1%. These ratios are in accord with the Medico-Actuarial Investigation and with those derived from the Metropolitan experience by Dr. Ogden. In Class 7, however, the mortality ratio of 122% is equivalent to an increase of about seventeen deaths in this group. There were six deaths from Bright's disease or 10.5% per 1000 exposed to risk, about four times the Company's experience in these issues. It is worthy of notice that when Class 7 was subdivided by ages at entry, it showed a mortality ratio of 112% for ages under 40 and 136% for ages 40 and over indicating that "Albuminuria is of greater significance above age 40 than below that age."

Dr. Gage—Is there any further discussion of Dr. Rogers' paper?

Dr. Van Wagenen—Mr. President and Gentlemen: This is probably one of the most interesting papers we have ever had, for I can fairly say that no subjects which come before our Medical Board give us as much annoyance as these slight albuminurias and glycosurias, not only on account of the difference of opinion between members of our Board, but because of

the prevailing opinion, as Dr. Rogers says, among agents and laity as to the comparative insignificance of very slight albuminuria or glycosuria. I am also convinced of the correctness of the statement Dr. Rogers makes in his paper, that the statistics given us by the Medico-Acturial Society's Investigation are not fair to these two classes, because in the experience of our own company, *all* cases of albuminuria and glycosuria were formerly absolutely declined. We would not entertain them *at all*, having no method of sub-standardizing them, either by loading the premiums or increasing the age. As we do *no* sub-standard business, those cases were turned over to sub-standard companies. In other words, *we* declined them absolutely. Therefore the statistics of *our* company, at least, on albumin and sugar, would be open to the charge of unreliability. I wish we could get some more reliable mortality figures on these subjects, for they are the most annoying ones that come before us.

Dr. Emery—Mr. President, may I call attention to two or three points? In the beginning, Diabetes is usually intermittent and that should always be borne in mind. Next, the reported presence of sugar at some time previously, taken in connection with the failure to find sugar at the present time does not always show that the appearance was casual, for two reasons, one of which I have already assigned, and the other, the preparation of the patient for further examination. In order to overcome the latter point, it has been the invariable custom of our company to insist upon a test meal being taken in the presence of the examiner, the specimen to be passed three hours thereafter in the presence of the examiner, and carefully examined.

Dr. Wells—Mr. President and Gentlemen—I would like to ask Dr. Rogers a question with regard to the method of procedure in determining albumin. Has the word of the examiner in the field been taken in these cases, or has this been confirmed by laboratory diagnosis at the Home Office? Also with regard to sugar, is the word of the examiner in the field confirmed at the Home Office? I think it has been the exper-

ience of a good many companies that when reports come in that albumin or sugar has been found, and are checked up by the Home Office laboratory, we find differences of opinion. Sometimes the examiner in the field is in error and our chemist does not find the albumin or the sugar, and sometimes vice versa; but it occurs to me to ask whether the word of the examiner was taken, or whether his report was confirmed by Home Office examination.

Dr. Cook—Somewhat along that line, I would like to ask Dr. Rogers a question, and that is, whether there was any attempt to discriminate in quantity of albumin—whether this represents a class of men who show albumin in any quantity whatever, from a faint trace to a large quantity, or whether an attempt was made to distinguish between a faint trace and a large quantity, and if so, whether any conclusion was arrived at, as to the distinction in these special groups.

I should like also to know if Dr. Rogers is willing to give us his impressions in regard to Class V. Although the class is small, I think he might supplement his written report with impressions, or perhaps the experience of his own company, as to whether it was favorable or not, in the intermittent albuminurias which are ordinarily accepted as standard risks.

One more question, with regard to Class IV, albumin with casts, showing a ratio of 250%—was there any attempt to divide that by age groups, as to whether albumin with casts is more favorable at the younger ages than at the older ages?

Dr. Gage—If there is no further discussion, I will ask Dr. Rogers to close.

Dr. Rogers—With regard to Dr. Wells's question, I should like to say that while I cannot speak positively with regard to some of the business taken in the earlier years, substantially every case that appears in this report as a case of albuminuria or of glycosuria has been confirmed by Home Office examination, so that with a few possible exceptions, this represents

the story as you get it after you have made your own investigations.

With regard to the intermittent albuminurias, the amount of material available was extremely small, for the reason, as stated in the paper, that these intermittent albuminurias have gone elsewhere. We have always treated them as sub-standard risks, but my recollection of the material is that we were satisfied with the correctness of our position. Further than that, I should not dare to say, from memory.

As to the amount of albumin, I think it is a very rare thing to find a very profuse albuminuria without casts, and if we did find some casts with a profuse albuminuria, we would exclude such a case absolutely, so that really the albuminuria that we are dealing with is anything from a trace to a fairly moderate amount of albumin.

Now with regard to glycosuria, I was very glad indeed that Dr. Dwight made the point that in dealing with glycosuria, you are dealing with a very serious condition of affairs; and a condition of affairs in which you are very liable to deception and to fraud, more liable to concealment of facts than in almost any other thing that we have to deal with. The applicant for insurance is in position to groom himself for examination. He will abstain perhaps for some little time before he comes up to you, and if you find no sugar in the urine, you cannot be sure that he really has had only a temporary glycosuria. You can be rather more sure that he has groomed himself, and that after you have had him for a while on your books, you are liable to have a high mortality in cases like his. The testimony of the Medico-Actuarial and Dr. Ogden's testimony represent cases that have been most carefully selected in that group, it seems to me, because such impressions as I have on the subject run exactly the other way, namely that you are going to get a high mortality among these people.

Another point, with regard to the finding of casts in the urine, I am speaking entirely in the family. I am beginning to feel very wobbly about one thing. We have all adopted the practice of securing our specimens from a distance, and we

have been using various preservatives to insure the receipt of fairly normal specimens at the Home Office. Some of us have used boric acid, and some of us have used formalin, and we have been experimenting with various things, and there is one thought in connection with this that occurs to my mind over and over again, that is, has the ideal preservative yet been found for our purposes? We want not only a preservative that will insure the transportation of the specimen without any considerable bacterial growth, but we want in addition to that, a preservative that will actually preserve the casts, if there are any, in transportation. I am coming to feel as if, perhaps, we were finding too few casts in our Home Office specimens, as if the preservative that we are leaning on is not sufficiently preservative; that the transportation of the specimen, the constant jolting of the railway carriage, the tossing of the container by the handler of the mails, was actually shaking down and disintegrating our casts, and that we had yet before us the problem of finding a preservative that would do the work. Formalin will undoubtedly give us better results than boric acid, for purposes of transportation, but formalin interferes with the test for sugar, and so we are a little bit up a tree. I should very much like to see this Association as an Association make very careful study on the subject of preservatives, with a view to the adoption by the Association of a preservative that is compact and feasible, and that will actually "deliver the goods." I think that this is a serious matter. It involves a good deal of work, and work on the part of people more competent than I to deal with the subject, but it is a thing that I should like to suggest that the Association take up.

Dr. Willard—Mr. President: On that point I should like to ask Dr. Rogers if he has a means of comparing the results obtained in the examination of his specimens sent from the field, and those which are procured in the Home Office, as showing a larger percentage of casts found in the specimens secured in the Home Office, where there were no transportation dangers to overcome.

Dr. Rogers—I have nothing very definite on that subject, but I have just enough to make me feel doubtful, and it is one of the things which I am going to take up in our office at an early date. I should recommend that it be taken up in a number of our offices to ascertain what wastage there is of casts, what loss of casts in transportation, under the effect of various preservatives. I have come almost to the conclusion that we shall have to make use of two containers, a container to carry enough urine for microscopic examination, in which formalin shall be used as a preservative, and a container for the chemical side, in which boric acid shall be used.

Dr. Jaquith—I raised the question as to whether or not the general belief in the past that glycosuria was not a serious matter at the older ages might have influenced your selection.

Dr. Rogers—There has been so far as I know, and I think I am pretty safe in saying it, no influence of preconceived notions in the selection. By selection in these statistics is meant the selection with respect to other aspects of the subject. Where we say in this paper that we have selected an albuminuria case more rigidly we mean more rigidly in other respects, and not with regard to the point of albuminuria, and the same with glycosuria. By anti-selection we mean of course the grooming of himself by the applicant for examination.

Another point is the presence or absence of acetone. We have for a long time examined for acetone in our office, and these statistics which we have presented regarding glycosuria represent glycosuria without acetone. Every case of acetonuria, we reject absolutely. We will not touch cases of that sort, because even if you have the merest trace of sugar, if you have acetone, you are probably dealing with a case that has been groomed for examination, or if the sugar has disappeared and the acetone remains, you are dealing clearly with a case groomed for examination. Acetone is a thing you have got to leave absolutely alone.

Dr. Hamilton—I would like to ask Dr. Rogers what tests he uses for the determination of albumin.

Dr. Rogers—we use the standards of the Association—the

contact test, as a rule, and where there is any doubt whatever, we use the heat and acid test.

Dr. Muhlberg—For some years, we have been experimenting to find a satisfactory preservative for urine. Boric acid, which is still used by this Company, answers the purpose excellently except that in concentration of two grains to the ounce, it does not prevent the growth of yeast. In fact, in one sample mailed to us, which contained almost five per cent. of sugar, and in which boric acid was used as a preservative, the sugar entirely disappeared from the sample in about a week's time, through fermentation on account of the accidental contamination by some form of yeast prior to its receipt. This fermentation occurred at room temperature.

It is a rule of our laboratory to request additional samples, where the microscopical examination shows considerable yeast contaminations. Since we have adopted the method of sterilizing our bottles by heat and of preserving corks when not in use by immersion in five per cent. formalin solution, contamination rarely occurs.

Formalin is a splendid preservative, particularly for casts, but if enough formalin is used to prevent yeast growth, you cannot check up your sugar tests with the fermentation test; and if you use only enough formalin to check bacterial and not yeast growth, it suffers from the same criticism as the boric acid preservative. In addition, of course, formalin reduces Fehling's solution.

We tried for a while to find some method of precipitating formalin out of the urine or of boiling it out of the urine, where it was desired to ferment, but we have not been successful in this. At the present, despairing of finding a good preservative, we are endeavoring to develop a good practical quantitative method for ascertaining the percentage of sugar in the urine, that does not involve its fermentation, but so far, we have not been successful.

Dr. Van Wagenen—In our office, we have used formalin entirely as a preservative. We use it in very small proportions— $\frac{1}{2}$ m.m. to a drachm of distilled water, and that added to an

ounce of the urine. We find it perfectly preserves the urine, even on the way from San Francisco; and it has not, so far as we believe, interfered with our sugar test. We have installed an electric incubator, and suspicious cases are tested afterwards by fermentation, with which that small amount of formalin does not interfere, though it preserves with absolute certainty. One sample came from the city of Mexico some time ago, perfectly preserved. If there is a reaction by either Fehling's, Benedict's, or any other of the copper or bismuth tests, we can usually ferment these urines, if properly incubated with yeast at the proper temperature, and yet we have not found any trouble in preserving them on that small amount of formalin. However, the moment you increase the amount, you will usually get interference with the sugar test, and prevent fermentation.

Dr. Toulmin—It might be interesting to know that in some experiments we are making with the various preservatives, we try to imitate the trip of a specimen across the United States, by tossing the bottles out of a second story window, shaking them up, and keeping them for four or five days, having examined the urine when perfectly fresh, and then examining it on the first, second, third and fourth days. So far as we could determine, there were as many casts at the end of the fourth day as on the first day.

Dr. Rogers—Have you ever tried it with using boric acid?

Dr. Toulmin—We gave up boric acid as a preservative, so we confined our further experiments to formalin.

Dr. Rogers—I am pretty sure about the formalin, so far as the preservation of the casts is concerned.

Dr. Toulmin—But I am having further experiments made to see if in transit the casts are broken up and destroyed.

Dr. Rogers—They will not be with formalin. I believe that formalin is very trustworthy as a preservative of casts, but the question is, to what extent it interferes with other tests.

Dr. Toulmin—We get another specimen for the sugar test without formalin or other preservative being added.

It was moved by Dr. Weisse and seconded by Dr. Rogers that the members of this Association who are in active military duty, either with our Canadian confreres, or with the United States forces have their dues remitted for the period during which they are on such duty. The motion was carried.

Dr. Eakins then read the following paper, entitled:

MEMORANDUM *re* FRACTURE OF THE SKULL

BY OLIN M. EAKINS, M.D.,

Medical Director, Reliance Life Insurance Co.

The following memorandum was put together in the rush of much other work and is submitted with apologies; also with the request that its crudities, lack of finish and finality be overlooked. It would not be presented to you at all, except that our President had a promise; and it may be of value by introducing a question which should be answered, but which I have been unable to answer definitely. Basing an estimate upon the number of cases of skull fracture which my Company has been called upon to handle during the last few years it is reasonable to assume that the Companies of this Association pass judgment upon over 1200 such risks each year. Not a very large number, to be sure, but sufficiently so to warrant the subject being mentioned.

Fracture of the skull as a problem was prompted by one specific instance which came to my attention. Its history follows: Depressed fracture of the skull; struck by a locomotive. Pressure symptoms were relieved by removal of bone. Two years later spasms developed from adhesions between skin and dura. These were loosened. No further symptoms appeared until another two years had elapsed, being four years from the date of the injury. In another year

death occurred from convulsions due to a recurrence of the adhesions. From the fracture as a cause, death resulted after the lapse of five years.

It is astonishing how meagre is the available data concerning the after-effects and end results of skull fractures, and how far one has to go to obtain the little which is contained in this memorandum. I selected the subject because I believed it desirable to find out a few facts concerning it. I imagined the finding of them would be comparatively easy but I was mistaken. Although the literature covering skull fractures themselves is voluminous, the facts about end results are few and far between. Covering the general group of Head Injuries:

1. Concussion without fracture.
2. Fracture of the Base.
3. Fracture of the Vault.
4. Simple, compound, comminuted and complicated fractures, it has been impossible for me to find any data permitting of a satisfactory study from which to obtain an inkling of the end results in the various members of that classification. Of necessity, then, my study was restricted to generalities without any further desirable subdivision.

It was simple enough to determine from certain groups of statistics that in 1854 cases of skull fracture 759 died, giving an immediate mortality of over 40%; and of these, 62% died within twenty-four hours and 95% within five days. But to determine the subsequent history, and the extra mortality of the 60% who did not die promptly after a head injury was practically impossible because of the absence of proper facts and figures.

We should be able to answer two such general questions as:

1. Are individuals with a history of fracture of the skull insurable as standard risks?
2. If so, how long after complete recovery?

Replies to the first question are practically uniform but those to the second would seem to indicate that more facts than we now have are needed in order to crystallize our ideas

to a better uniformity. To answer it with any degree of accuracy it is necessary for us to know:

- A. Elapsed time from fracture to "complete recovery."
- B. Time during which symptoms may persist.
- C. Elapsed time after which—with or without symptoms—no trouble may be anticipated.

Caption C is Question No. 2, in fact, which we really should be able to answer with more authority than is now possible.

So far as either early or late fatalities are concerned, fracture of the skull, *per se* is unimportant. "Neither the shock of an uncomplicated fracture nor the hemorrhage from the osteal vessels is ever fatal." The complications kill, not the fracture. "A fracture itself is no menace to life or future capacity. But once the brain itself is injured, no one can predict positively the outcome. And that the brain may sustain serious and even fatal injury without bone lesion, is well known. Consequently, while the majority of injuries to the brain are associated with, or secondary to, skull fractures, the seriousness of the condition is to be measured in terms of brain, not of bone."

The complications of importance to us in handling the cases are:

- 1. Hemorrhage.
- 2. Thromboses of sinuses.
- 3. Contusions.
- 4. Lacerations.
- 5. Inflammations, almost always septic.
- 6. Atrophy.
- 7. Loss of continuity with liability to serious injury.
- 8. Detached fragments; may become encapsulated in the dura and give rise to irritative pressure, followed by remote neuro-psychic disturbances; or they may become necrosed and occasion dural or peripheral abscess.

Most of these complications may be dismissed with their simple enumeration.

In contusions, although no evidences—in recovered cases—of structural alteration in the cortical centers can be demon-

strated, the fact remains that there is a subsequent instability of cerebral nutrition. Such a sequel of intracranial injury, which always obtains in contusions, leads to the fact that "such persons are frequently unable to endure serious mental or physical labor, exposure to the sun, moderate alcoholic stimulation, or many other of the fatigues and pleasures incident to ordinary life."

From lacerations, late deaths are usually caused by a septic inflammation set up in the sloughing tract of the laceration; a traumatic abscess. A deep traumatic abscess never results in spontaneous recovery and, unless operative interference offers some hope, sooner or later ends in death. Death may occur in from a few days to ten years or longer. During the interval the patient may enjoy perfect health or suffer more or less from headaches, from temporary attacks of aphasia, from one-sided numbness or from other evidences of focal lesion. Unfortunately the diagnosis of lacerations is so difficult that only in rare cases can it be made with certainty. It is said, though, that loss of urinary and fecal control is practically pathognomonic of laceration irrespective of the region of brain involved.

All epileptics are looked upon as a hazardous class. "Epilepsy is one of the most frequent affections of the nervous system and is among the commonest of chronic disease." It is a significant fact that almost all epileptics, if permitted to classify themselves, would be suffering from "traumatic epilepsy"; idiopathic epilepsy automatically becoming practically non-existent. Injuries to the head, if we are to accept the usually expressed belief, are an even greater causative factor in epilepsy than are falls in cases of tubercular spines and hips. The fact of the matter is, however, that probably not more than 1% of the total number of cases could be proved to be of traumatic origin according to the Vanderbilt Clinic records. Other observers variously assume the percentage of cause to effect, but the estimates are not homogeneous covering epileptics alone as they included a choice variety of other post-traumatic insanities, even paresis being amongst their

number. But its inclusion antedates our present knowledge of the traveling capacity, the predilections, and predatory characteristics of the Pallid Spirochaete. The number of cases entering into the different computations was 9385 of Epilepsy or Insanity or some form of mental incapacity in which 196 were directly traceable to head injury, giving a general total of nearly 5% (.048).

A better way of going about it for our purposes, perhaps, is to reverse the procedure and to consider other groups where, in 9404 cases of head injury there resulted 119 cases of Epilepsy, Insanity or mental incapacity, about 1% (.0126). Of this group of figures the lowest ratio is 8985 with 46 cases and 100 with 43 cases; $\frac{1}{2}$ of 1% (.005) and 43% (.43) respectively. In 300 cases of head injury, studied by English, 27 developed Epilepsy after a year or longer. It is fairly safe to say, however, that if Epilepsy is going to develop, following a head injury, that sequel will obtain in the majority of cases within a year, although the possibility of exceptions must not be forgotten.

Dependent upon the source of the figures, from 5% to 20% of brain tumors are the result, directly or indirectly, of trauma.

The following table and quotations are taken from English.

Table covering after effects, in 200 "Recovered" cases, from one to twelve years.

	Fracture	Concussion, Contusion, Laceration without Positive Evidence of Fracture	Total
No Effects	31	48	79
Slight Effects	50	42	92
Marked Effects	19	10	29
	100	100	200

"These figures throw a more serious light on the prognosis of head injuries than is usually recognized but they faithfully represent the results of my investigations. My experience

62 Twenty-Eighth Annual Meeting

is that some degree of mental impairment, though rarely sufficient to be included under the title of traumatic insanity, occurs in over 10 per cent. of the patients."

"I may mention here that 12 patients out of the 200 cases followed up had died. In only one of these was death proved to be the direct result of the head injury, the patient dying in an asylum five years later. Six died from disease, two were killed in other accidents, and in three cases the cause of death was not ascertained. It is highly probable that in another case death was the ultimate consequence of the head injury but I failed to ascertain the actual cause of death; when last seen the patient was suffering from severe traumatic epilepsy and mental impairment." It is impossible here to work out any accurate mortality table; but if we may be permitted to assume the average age to be 30 and the known deaths occurred within five years, we would have a percentage of actual to expected deaths of 140, using the actuaries' table.

Number of Lives	Actual Deaths	Expected Deaths	Per cent. Actual to Expected
200	12	8.601	139.52

Another table from English covering "Effects on Working Capacity."

	Fracture	Concussion, Contusion, Laceration without Positive Evidence of Fracture	Total
No Marked Effects	52	63	115
Did light work	13	6	19
Only able to do a little work	7	4	11
Gave up trade	8	2	10
Totally Disabled	6	3	9
	86	78	164

Much difficulty was experienced by those individuals whose occupation required balancing, as builders, bricklayers, carpenters, painters. Sixty per cent. of fractures and 80% of non-fracturing injury show what may be considered a complete recovery. But it leaves 40% and 20% who are more or less disabled, a group from which some extra mortality must be anticipated. Just what that extra may be is impossible to determine with the meagre data at hand. But an approximate estimate may be made by considering two main factors: The length of treatment with complete mental rest, and the occupation. English found that the average time after which the patients returned to work was:

Simple Concussion	4½ weeks.
Cerebral Contusion	9½ weeks.
Cerebral Lacerations	13 weeks.

It is believed that the reason why so many cases of head injuries develop untoward after effects is because the treatment, with complete mental rest, is altogether too short. "Usually after severe injury it is twelve months, or even two years, before the patient feels as well as before the accident." "At least a year is required for complete recovery in most cases of severe head injury." Here the occupation and the immediate wage-earning necessity have an important bearing—other factors being age, social status, alcohol, neurotic inheritance and a predisposition to any nervous disturbance. It is wise not to lose sight of the fact that the higher intellectual functions are the last to completely recover. In those cases in which after results obtained there appeared several symptoms alone or in combination. Increased susceptibility to alcohol is constant in almost all cases, 100%—Headache in 83%—Inability to stand high temperature in over 50%—Change of disposition, 49%—Painful or tender scars, 40%—Vertigo, 22%—Vomiting—Nervousness—Mental or physical depreciation—Disturbed sleep.

From the foregoing we can draw, in a rough sort of way, the conclusions that:

64 Twenty-Eighth Annual Meeting

1. Fracture of the Skull or other grave head injuries, even after "recovery," are followed by untoward sequellæ in 60% (.605) of the cases and in 30% (.298) the wage-earning capacity is permanently impaired.

2. Symptoms indicating which ones will become impaired, either as wage-earners or risks, may or may not be present.

3. At least a year should elapse from "complete recovery"—not from date of injury—with entire freedom from symptoms, before the individual may be considered to be free from danger.

With these three conclusions we may tentatively answer our original questions as to whether individuals with a history of skull fracture are insurable as standard risks or not, and when.

Because of a necessarily hurried preparation of this memorandum, changes in the filing room personnel and the absence of a cross reference card, I have lost sight of a goodly portion of the bibliography and can refer only to that appended.

REFERENCES.

CHARLES PHELPS. "Traumatic Injuries of the Brain and Its Membranes." 1897.

T. CRISP ENGLISH. "Hunterian Lectures on the After-Effects of Head Injuries." *Lancet*, 1904.

PEARCE BAILEY. "Injuries to the Brain and Nervous System." 1912.

The tellers announced the result of the ballot for nomination of officers, as follows:

PRESIDENT

DR. W. A. JAQUITH

FIRST VICE-PRESIDENT

DR. A. B. WRIGHT
DR. T. H. ROCKWELL

Nominations of Officers

65

SECOND VICE-PRESIDENT

DR. T. H. ROCKWELL
DR. W. W. BECKETT

SECRETARY

DR. F. S. WEISSE
DR. C. F. S. WHITNEY

TREASURER

DR. A. S. KNIGHT

EXECUTIVE COUNCIL

DR. E. W. DWIGHT
DR. G. A. VAN WAGENEN
DR. J. ALLEN PATTON
DR. T. W. BICKERTON

EDITOR OF PROCEEDINGS

DR. A. B. HOBBS

Dr. Wells asked the privilege of withdrawing Dr. Rockwell's name as candidate for First Vice-President. Dr. W. W. Beckett asked to withdraw his name as candidate for Second Vice-President.

AFTERNOON SESSION

Dr. Gage—We will now take up the discussion of Dr. Eakins's paper. I was particularly struck with one remark of Dr. Eakins's about contusions and the possibility of the sequelæ that follow simple contusion of the brain, and he made us all very sympathetic,

when he said that they were frequently unable to endure serious mental labor, or moderate alcoholic stimulation, or many *other pleasures* of modern life. I suppose that referred to the moderate stimulation!

Dr. Rogers referred to the fact to-day that it is perfectly impossible to find in medical literature anywhere the real results of accident, of operation, or of the treatment of disease; but these things will all come gradually, and this paper, it seems to me, is a very interesting review of what we do know about the subject now, and I think ought to make us all very cautious about accepting any of these cases until the lapse of a very considerable period,—my own idea would be a five-year period. Then in cases of simple fracture of the skull, with five years elapsing, without symptoms or evidences of cerebral degeneration of any kind, I believe that the simple fracture can be disregarded, and that the danger of brain injury by five years has been eliminated. But that of course goes back to the old idea of impressions and opinions. It is not fact, and sooner or later we shall have fact, I suppose.

I will ask Dr. Muhlberg if he will say something in discussion of Dr. Eakins's paper about fracture of the skull.

Dr. Muhlberg—I can conceive of few subjects offering greater difficulties than an essay on the Fractures of the Skull, with reference to insurance selection, and I wish to congratulate Dr. Eakins on the lucid presentation of his thesis. His paper brings out very clearly several important facts.

In the first place, the injury to the bone itself is of very little

moment; the impairment must be gauged solely by the injury to the brain and by the sequelæ that ensue.

Secondly, that while the untoward consequences can be measured somewhat by the nature and locality of the injury and the symptoms that were presented at the time of the trauma, the most important evidence in the condition of the patient a year or more after the injury. Where the trauma has left some gross defect, that can be objectively discovered, such as paralysis, areas of anesthesia, decided mental impairment, disturbed reflexes, bladder or rectal disturbances, etc., a decision is not difficult. But unfortunately, the sequelæ are usually of a subjective nature—vertigo, dizziness, loss of memory, irritability, etc.—the existence of which can be elicited only through statements of the applicant, and is therefore, extremely difficult to establish through an insurance examination.

The Medico-Actuarial studies give little or no assistance, but it is a noteworthy fact that the investigation covering sunstroke, based, it is true, on a very small number of cases, shows a mortality of 160%.

There are many points of resemblance between a simple concussion or contusion of the brain and heat prostration. Both are likely to be followed by similar sequelæ—some loss of memory, irritability of temper, insomnia, headaches, occasional attacks of vertigo and inability to withstand extremes of temperature. It is not unlikely that the pathological consequences attending both may be very analogous from the standpoint of changes in the finer chemistry and physiology of the brain structures. If this is so, and if the statistics on insolation are confirmed by a study of a larger number of cases, they would afford a confirmation of the mortality figures of 139% given by Dr. Eakins for fracture and for concussion, contusion, and laceration without positive evidence of fracture.

We must not lose sight of the fact that the brain differs from all the other organs in the body except the heart, in that while it is possible to destroy a large area of kidney, liver, pancreas, or lung surface without necessarily shortening life,

this can not be done with brain tissue, except for the so-called physiological silent areas. In fact, the destruction of a very small part of brain substance in the medulla is incompatible with life.

The "complete recovery" rule of Dr. Eakins is unquestionably wise, but the period, instead of being fixed for only a year, might, in certain cases, be prolonged to several years, depending upon the extent and nature of the injury, and of the operative interference, if any, and the time it took for full recovery to become established.

This subject is one that is very likely to become of great importance in the future. Should our army become actively and extensively engaged in the European War, it is probable that we Medical Directors will be called upon frequently to pass on risks giving this history, for the reason that head injuries are very common among the soldiers at the front, on account of the shrapnel wounds. It will be our patriotic duty to deal fairly and justly with these applicants.

Dr. Van Wagenen—May I ask Dr. Eakins whether any attempt was made to distinguish between fractures in different parts of the skull? I think the long interval should apply especially in fractures near the base. I had the opportunity of watching my brother who had a fracture, so far as symptoms could prove, at the base, and it was a great many years before he was at all himself after that injury. He did finally recover, though desperately ill for months; and for years after, if he even raised slightly on his toes and came down on his heels, he felt as if he had received a blow on the back of the head, his disposition was changed, and he was more irritable. Before that, he had been unusually quiet and level-headed. Certainly fractures near the base demand a very long interval before they should be considered normal risks.

Dr. Jaquith—I would like to report what seems to me a very unusual case, an account of which appeared in the *Lancet* in September. Dr. J. B. Christopherson, Director of Civil Hospitals of Khartoum and Omduram, was called to see a man who had a temperature of 104 degrees, with symptoms of

brain disturbance. He died at the end of four days. A post-mortem examination showed the presence of an abscess about the size of a thumb-nail in the frontal region which looked to him from the induration as if it had been an old condition. The doctor wrote to relatives of the deceased to find out if he had ever had a head injury, and learned that twenty-four years previous, while riding, he had fallen from his horse, injured his head and remained unconscious for two weeks. His recovery was slow, but apparently complete, except for loss of smell and periodical attacks of occipital headaches whenever he exerted himself. While this abscess appeared in the frontal region, the attacks of pain that he had were in the occipital region. These attacks were cured by a day in bed and a little aspirin; the occasional slight attacks of dizziness and of pain in the head being probably due to small attacks of meningitis, the inflammatory process spreading beyond the confines of the abscess and becoming checked by suitable treatment. His conclusions were that it was unwise to prognosticate in the case of fracture at the base. A fracture at the base, although apparently recovered from, is still a very serious thing.

Dr. Gage—Will Dr. Eakins close the discussion?

Dr. Eakins—I am indeed indebted to Dr. Muhlberg for his discussion which aids materially in making my memorandum an entity. I was not and am not very much pleased with the memorandum, because it lacks sufficient merit as a teaching or as an informative document. To obtain such informative facts, I sought in vain in the Lyons Dissertations of C. Maisiat (1892) and M. Beaulies (1895); in the Wurtzburg Dissertations of C. Schultz (1885); the United States Army and Navy Public Health Reports; the Massachusetts General of Boston, Peter Bent Brigham and Johns Hopkins Hospitals; and in the record of Industrial Accidents, Bureau of Labor Statistics. I rather thought I was going to find considerable there, but I was very much disappointed.

Dr. Muhlberg has rightly emphasized the difficulties of establishing the true status of facts through an insurance examination. To this I can add from memory that in only negligi-

ble instances of skull fracture cases did our Examiner bring forward (even after re-investigation), any subjective factors of interest. In handling the cases, we are left in the dark, and are compelled to exercise our imaginations.

About the finer chemistry and physiology of the brain structures, I have forgotten a little and know nothing now. I do know, however, that the histology in insolation, heat prostration, and acute alcoholic poisoning, is or once was, identical. The fact that all skull cases are overly susceptible to alcohol is at least significant. The physiologist and pathologist may be able to tell us something from which we can deduce parallels to aid us in assuming mortalities. We might be able to reason from a combination of the mortalities in insolation and alcoholic excesses, a nearer answer in skull cases than the 140% already mentioned. That 140% is as close as I can come to it with the data available, but to paraphrase Dr. Dwight's comments of this morning, it is a very inexact set of figures. They are carefully done, but their accuracy is questionable.

I am not sure that the one year conclusion is correct. It is a certainty that some of them are cured to all intents and purposes within a year, and without anticipating any subsequent evils. Naturally there are others which are not. Dr. Jaquith speaks of one which died after twenty-four years, following a second injury. If I recall correctly, in English's study, there was one case where the death was traced directly to a skull fracture and occurred a matter of thirty years after the injury. It was one of those cases of a deep-seated abscess. I really believe it is a question of tossing a coin in the air and letting its fall decide between the one year of complete recovery, the five years that Dr. Gage suggests, the twenty-four years of Dr. Jaquith, or the thirty years which appears in the records.

The auditors reported that they had examined the accounts of the Treasurer and found them correct.

On motion, the Treasurer's report was accepted and placed on file.

Dr. Harry Toulmin then read the following paper, entitled:

THE INFLUENCE OF WEIGHT WHEN COMBINED
WITH THE FAMILY HISTORY OF TUBER-
CULOSIS

BY HARRY TOULMIN

Medical Director Penn Mutual Life Insurance Company

Being disappointed by my inability to obtain the necessary data at this time on which to base a paper on a subject chosen by our President, I have fallen back on a study of our experience, made comparatively recently, in the hope that while somewhat fragmentary and incomplete, it still will bring out certain truths, not new, but ever of vast importance in our work. The Medico-Actuarial Reports, the splendid Presidents' addresses, delivered in 1912, by Dr. Symonds, and in 1914 by Dr. Root, and the discussions which followed, have shown how important are the factors of age and build in determining the mortality in the large class of Family History of Tuberculosis. Our own data are not so numerous, but we have made more subdivisions by weight, and have also some interesting notes on the deaths in some of the classes.

The data upon which this paper is based consist of Penn Mutual issues of 1885 to 1908, carried to their anniversary in 1909. It is well to remember that during this period we were rather liberal in our selection, accepted business from all the Southern States, and limited some cases to Endowments, or limited Life plans, in the mistaken idea that we were thus satisfactorily meeting an anticipated high mortality. While we did not then realize the full importance of light weight at the younger ages, we were, I think, wary of this class, when associated with tuberculosis in the family history, and

were stricter in our selection, but, as will be shown hereafter, still much too liberal. I believe, too, that we considered the death of a parent from tuberculosis of much more import than the death of a brother or sister, and for this reason selected more carefully in the former than in the latter class.

We made a study of five age groups,—29 and under, 30-39, 40-49, 50-59, and 60 and over, known as A2, A3, etc.; five weight groups,—up to 85% of the normal, 86-95%, 96-105%, 106-120%, and 121% and over, known as W1, W2, etc.; and nine family-history groups, being various combinations of parents, brothers, and sisters, uncles and aunts, or other members of the family having or having had tuberculosis (see Table 1A). There was no attempt made in this study to exclude the types of tuberculosis other than pulmonary, nor to separate the class of those in whose family a tubercular member was still living from that in which the infected member was dead. From this point of view you may consider our work open to criticism. I think we went into too much detail in the family-history groups, and possibly might have done well to have subdivided the age at entry groups. I apologize for our shortcomings, but earnestly hope the results will show that the study was not in vain, and has really given us some results of value.

It should be stated that the investigation is by policies only. Joint Life and Survivorship policies were omitted, as were rewrites under new numbers without new examination. Durations were taken to the nearest integral year, a fraction of $\frac{1}{2}$ or less being dropped and a fraction of more than $\frac{1}{2}$ being taken as one. The actual mortality experience was related to that expected under the Medico-Actuarial table. Examination of tables of the Company's policies by age at entry has warranted the adoption of 25, 35, 44, 54 and 62, respectively, as the average ages at which policies are issued in each of the five corresponding age groups. It was necessary to introduce interpolation to complete the Medico-Actuarial table as to the four years of selection with respect to these ages.

The experience in each of the 225 classes and under certain combinations was ascertained and charted, and the actual deaths by causes noted in each subdivision. The study included 30,969 policies, involving 188,762 exposures, with 1486 deaths.

The tables are grouped at the end of the paper.

Table I.,—each age, and all ages, history of parents and no parents, and all histories, and each weight and all weights,—shows the improvement in mortality at the young ages, with increase in weight, notwithstanding the fact that there was more careful selection in the light-weight class. The group as a whole was fairly large—9232 “lives”—with 251 deaths and a mortality of 95.2%. In the lightest weight group—85% and under, of average weight—the mortality was 112%. Weight group 2, 104.5%, weight group 3, 76.1%, weight group 4, 108%, weight group 5, 72%. A study of the deaths leads one to the conclusion that the large percentage in the 4th group was accidental. At ages 30–39, there is found the same general tendency of higher mortality in the light-weight groups, and lower mortality in the better developed applicants. At the older ages we find the same results that others have reported,—a low mortality in the light-weight groups but heavy weight giving us the usual high percentage irrespective of the family history. The subdivision into parents and no parents makes the data too small to be valuable.

Table I A, showing the mortality for the various family-history groups, for all weights and all ages, scarcely needs comment.

Tables II. and III. show the percentages by policy years, for age 29 and less, and 30–39, for the various weight groups. The fallacy of limiting these cases to Endowment plans, referred to above, is here conclusively demonstrated. But was ours the only Company to fall into this error? I am sure it was not. Have all the others learned the lesson these findings so forcibly present?

The great excess of deaths from tuberculosis is so marked

74 Twenty-Eighth Annual Meeting

that your attention is particularly called to the following facts:

Age at entry 29 and under, total deaths 251, 92 or over 36% were due to tuberculosis of the lungs, and 4 to tuberculosis of other organs. In the lightest weight group 57% were due to tuberculosis, in weight group 2, 42%; 39% in weight group 3; 13% in weight group 4; and 33% in weight group 5. In group 4 there were an excessive number of deaths due to acute diseases and accidents. In the Medico-Actuarial Report it is stated that at entry ages 15-29, 22½% of all the deaths were due to tuberculosis.

At ages of entry 30-39, there were 474 deaths, 81 or over 17% of which were due to tuberculosis of the lungs and 8 to tuberculosis of other organs. According to the five weight groups, beginning with the lightest weights, the percentages were 22, 22, 17, 4, and 0.

As a result of this study the following conclusions were drawn, and on them we now base our selection:

1. With a family history of tuberculosis, whether in parent or brother or sister, lightweights at the younger ages at entry show a high mortality.
2. The extra mortality decreases with an increase in the applicant's weight, except at the older ages, where overweights are accompanied by a high mortality.
3. At ages at entry 40 and over, a family history of tuberculosis has but little if any influence on mortality.
4. Lightweights at the older ages at entry, 40 and over, with a family history of tuberculosis, show a favorable mortality, corresponding to that of all lightweights at older ages.
5. Unless a company does a substandard business, it cannot afford to accept lightweights, at young ages, with a family history of tuberculosis.

TABLE I

RECAPITULATION: POLICIES, DEATHS, AND % OF M. A., FOR EACH AGE AND ALL AGES AND FOR EACH WEIGHT AND ALL WEIGHTS

and for history { of no parents (000 to 099): these figures being entered ABOVE in each case
and for history { of parents (100 to 299): these figures being entered BELOW in each case

as also for all histories: these figures being entered in BLACK in each case

	A2		A3		A4		A5		A6		A0	
W1	667	19 95 6	1238	46 105 3	761	48 102 9	250	21 74 0	58	21 300 5	2074	135 104 3
	232	11 158 9	408	22 117 7	354	14 01 5	124	13 95 8	38	8 85 6	1216	68 95 4
	899	30 112 0	1766	68 109 0	1115	62 89 3	374	34 81 0	96	29 149 7	4190	223 101 4
W2	2556	74 103 9	2759	120 116 4	1425	66 71 7	426	24 47 3	81	17 93 9	7247	301 89 8
	1779	40 105 1	1839	68 108 9	1060	38 70 0	199	26 61 3	136	25 82 3	10213	481 89 1
	3179	14 105 5	4133	187 118 3	2113	148 72 0	599	26 61 3	136	25 82 3	10213	481 89 1
	2223	41 09 8	2150	76 95 0	1305	69 92 9	420	44 81 4	71	18 141 7	6169	248 88 6
W3	902	26 88 7	1025	46 120 7	576	55 149 9	263	40 110 5	45	7 71 6	2811	174 115 9
	3125	67 76 1	3175	122 103 3	1881	124 111 7	683	84 93 1	116	25 111 2	8086	422 98 2
	819	23 109 8	1502	47 88 6	942	51 92 7	391	42 95 9	51	8 83 2	3705	171 93 7
W4	348	11 104 6	645	26 98 6	461	34 121 6	196	18 83 1	26	11 407 3	1676	100 112 1
	1107	34 108 9	2147	73 92 9	1403	95 102 4	887	60 91 7	77	19 354 3	5381	271 99 1
	211	8 53 5	122	13 92 1	138	10 71 8	70	11 158 7	7	1 131 0	1529	40 140 3
W5	75	1 53 5	232	8 98 7	153	10 175 2	70	11 158 7	7	1 131 0	1529	40 140 3
	306	6 72 0	684	24 94 3	494	32 117 7	302	23 117 7	19	5 252 9	1705	89 108 9
W6	6496	162 91 4	8111	305 102 7	4772	247 86 8	1619	142 75 12	273	68 131 6	21271	924 92 5
	2736	89 102 9	3724	169 115 8	2232	104 109 1	852	108 101 1	154	32 104 6	9698	562 108 0
	9332	251 95 2	11835	474 106 9	7004	411 94 5	2471	250 84 5	437	100 121 5	30969	1486 97 8

TABLE IA

ALSO- for all ages and for all weights and for EACH HISTORY	H1	4,807	147	78.9
	H2	6,417	182	78.1
	H3	8,837	533	106.7
	H4	1,210	62	77.0
	H5	8,188	467	112.2
	H6	1,048	59	79.1
	H7	252	17	105.1
	H8	171	19	173.8
	H9	39	0	.0
	H0	30,969	1,486	97.8

NOTE: H1—No parents, brothers and sisters, but 1 or more less nearly related.

H2—1 or more uncles and aunts.

H3—1 brother or sister.

H4—2 or more brothers or sisters.

H5—1 parent.

H6—A parent, and 1 brother or sister.

H7—1 parent, and 2 or more brothers or sisters.

H8—Both parents.

H9—Both parents and 1 or more brothers or sisters.

TABLE II

FAMILY HISTORY OF TUBERCULOSIS—ISSUES OF 1885 TO 1908,
to 1909 ANNIVERSARIES

MORTALITY EXPERIENCE

Ages	Weights	Years	Exposures (Policies)	Actual Deaths (Policies)	Expected Deaths (M.A. Table)	Actual Deaths Divided by Expected Deaths
29 to	85%	I to 5	3,262	15	14.3	105.1%
		6 to 10	1,488	7	7.3	95.5%
		11 to 24	911	8	5.2	154.5%
		I to 24	5,661	30	26.8	112.0%
	86% to 95%	I to 5	13,572	52	59.4	87.5%
		6 to 10	6,031	40	29.8	134.6%
		11 to 24	3,547	22	19.9	110.5%
		I to 24	23,150	114	109.1	104.5%
	96% to 105%	I to 5	11,027	43	48.2	89.3%
		6 to 10	4,894	14	24.1	58.0%
		11 to 24	2,804	10	15.7	63.5%
		I to 24	18,725	67	88.0	76.1%
	106% to 120%	I to 5	4,013	19	17.5	108.6%
		6 to 10	1,677	6	8.3	72.6%
		11 to 24	1,008	9	5.7	157.5%
		I to 24	6,698	34	31.5	108.0%
	120% to	I to 5	1,079	3	4.7	63.6%
		6 to 10	479	1	2.3	42.3%
		11 to 24	229	2	1.3	158.5%
		I to 24	1,787	6	8.3	72.0%
	All weights	I to 5	32,953	132	144.1	91.6%
		6 to 10	14,569	68	71.8	94.7%
		11 to 24	8,499	51	47.8	106.7%
		I to 24	56,021	251	263.7	95.2%

TABLE III

FAMILY HISTORY OF TUBERCULOSIS—ISSUES OF 1885 TO 1908,
to 1909 ANNIVERSARIES

MORTALITY EXPERIENCE

Ages	Weights	Years	Exposures (Policies)	Actual Deaths (Policies)	Expected Deaths (M.A. Table)	Actual Deaths Divided by Expected Deaths
30 to 39	to 85%	1 to 5	6,270	36	30.4	118.4%
		6 to 10	2,707	18	16.7	107.9%
		11 to 24	1,568	14	15.3	91.4%
		1 to 24	10,545	68	62.4	109.0%
	86% to 95%	1 to 5	15,146	78	73.5	106.2%
		6 to 10	6,825	55	42.0	130.8%
		11 to 24	4,291	54	42.5	127.1%
		1 to 24	26,262	187	158.0	118.3%
	96% to 105%	1 to 5	11,453	58	55.5	104.5%
		6 to 10	5,228	34	32.2	105.4%
		11 to 24	3,088	30	30.4	98.9%
		1 to 24	19,769	122	118.1	103.3%
	106% to 120%	1 to 5	7,853	30	38.1	78.8%
		6 to 10	3,566	20	22.0	90.9%
		11 to 24	1,994	23	19.3	118.9%
		1 to 24	13,413	73	79.4	91.9%
	121% to	1 to 5	2,478	10	12.0	83.2%
		6 to 10	1,159	11	7.2	153.8%
		11 to 24	656	3	6.3	47.7%
		1 to 24	4,293	24	25.5	94.3%
	All Weights	1 to 5	43,200	212	209.5	101.2%
		6 to 10	19,485	138	120.1	114.9%
		11 to 24	11,597	124	113.8	109.0%
		1 to 24	74,282	474	443.4	106.9%

Dr. Gage—I will ask Dr. Willard to open the discussion of Dr. Toulmin's paper.

DISCUSSION

Dr. Willard—Mr. President and Gentlemen: Brother Toulmin did not refer to one of the earlier investigations of this subject by one of the "old folks" of this organization, namely, Dr. E. J. Marsh. I have forgotten how long ago it is, and I am trusting entirely to my memory in making reference to it. Dr. Marsh made an analysis of the Mutual Life's experience, comparing groups of risks in which there was a family history of tuberculosis with similar groups in which there was no such history, and briefly stated his conclusions were, as I remember, that the presence of tuberculosis in the family history always had an effect, as compared with similar age and exposure groups in which there was no such history; that that increase in mortality as the result of tuberculosis in the family history while more evident in the earlier years of life, and with the lighter weights, was not exclusively confined to them, but even in the very late years of life, and after long exposure, there was an increase in mortality among those risks who presented this family history, as compared with similar groups in which no such history existed—groups just as similar as he could find them in his own experience; and that leads me to the only point that I can contribute, of possible value, and that is, that Dr. Symonds's and Dr. Toulmin's and Dr. Marsh's figures would have been ever so much more conclusive, and all our figures that we make would be much more conclusive, if we had really gotten all the facts, and by that I mean that Dr. Toulmin has not been able to put into these classes all of the people whom his company insured that did have consumption in the family history. To explain a little more fully, the applicant for insurance misrepresents his family history for two reasons: first, because he wants to misrepresent it, knowing the effect of a bad family history on his reception by the Company, and secondly, out of pure ignorance. The lower you go down in the scale of intelligence in society, the greater will be the latter factor; but it exists, and it exists all the while.

and if you have any doubt of that, just make it a point, as your cases keep coming in to you, of sending for the death certificates in all cases where three or more members of the family have died under age 35. No matter what cause is ascribed on examination papers as the cause of death, you will be surprised to find that anywhere from 18% to 30% of those deaths which are now recorded as "childbirth," "pleurisy," "pneumonia," and the more transparent ones of "decline" etc., turn out to be consumption, and therefore if these figures are based upon a small experience, and if they do present anomalies in the direction of the curve etc., it is largely because we have not got all the facts; but they all point in the same direction, they all point in the direction of that early paper of Dr. Marsh's in which he told us that the younger the applicant and the larger the infection of tuberculosis in his family history, and the lower the physical stamina, the greater will be the mortality and that there comes a time when, by the operation of the law of the survival of the fittest, in later years, with an increasing vigor of frame, the bad family history is almost nullified by the more favorable conditions of weight and years, and the fact that the weaklings had died off. But his paper did show that away up into ages 60 and 70, people died at a greater rate than the average, where their family histories presented a record of tuberculosis.

I think that this paper is a valuable addition to the papers that have been mentioned. They all point in the same direction. I do not propose to suggest for discussion the wisdom or unwisdom of any beliefs that we have entertained about tuberculosis and its transmission to the offspring of a tubercular parent. I will leave that to others who can talk about it better than I can; but I do say, and without fear of contradiction by statistics, that all other things being equal (and mind you, these early attempts at analysis of these things did not have any regard for other impairments and other factors, so that they were not homogeneous classes), if we did know all the facts about all the family histories of all of the people that we insure, these figures would be even more emphatic than they are.

Dr. Gage—Is there any further discussion of Dr. Toulmin's paper?

Dr. Porter—Mr. President, I have some facts which were not obtained for the discussion of this paper at all, but I was so impressed with them, and they so closely corroborate Dr. Toulmin's findings, that I am presenting them to you.

MORTALITY EXPERIENCED BY THE MUTUAL LIFE ACCORDING TO THE M. A. TABLE OF CLASS 53—ONE BROTHER OR SISTER DEAD OF TUBERCULOSIS—AND CLASS 55—ONE PARENT DEAD OF TUBERCULOSIS

ISSUES OF 1907-1913—EXPOSED TO 1914

LIGHTER WEIGHT GROUP-BUILDS 6, 7, 8, and 9

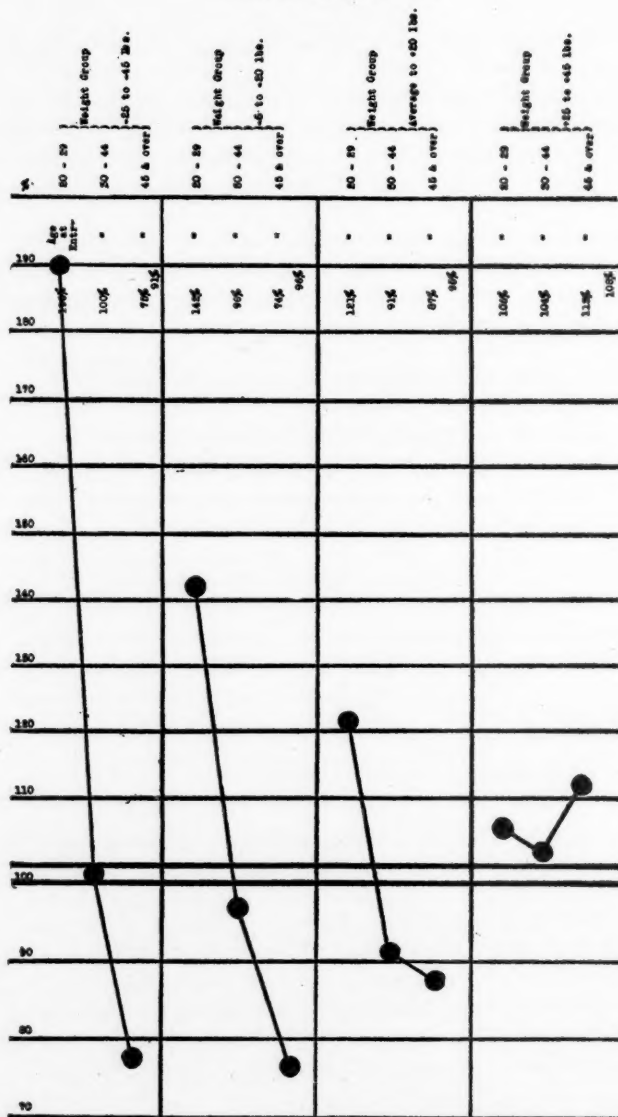
MED. IMP. CLASS 53—ONE BROTHER OR SISTER DEAD OF TUBERCULOSIS

Ages at Entry	No. of Entrants	Exposures	Deaths			Total Experience Ratio
			Actual	Expected	Ratio	
15-29	1,003	2,739	14	11.454	122.2	68.4
30-39	935	2,624	11	12.462	88.3	69.3
40-49	576	1,679	7	12.161	57.5	73.0
50-59	242	727	5	10.737	46.6	77.4
60 & Ov.	30	100	3	3.497	85.8	66.4
Total	2,786	7,869	40	50.311	79.6	70.9

MED. IMP. CLASS 55—ONE PARENT DEAD OF TUBERCULOSIS

15-29	1,461	4,102	18	17.168	104.8	
30-39	806	2,494	8	11.855	67.4	
40-49	388	1,229	7	8.894	78.4	
50-59	104	313	2	4.749	42.2	
60 & Ov.	14	44	1	1.499	66.7	
Total	2,773	8,182	36	44.165	81.4	

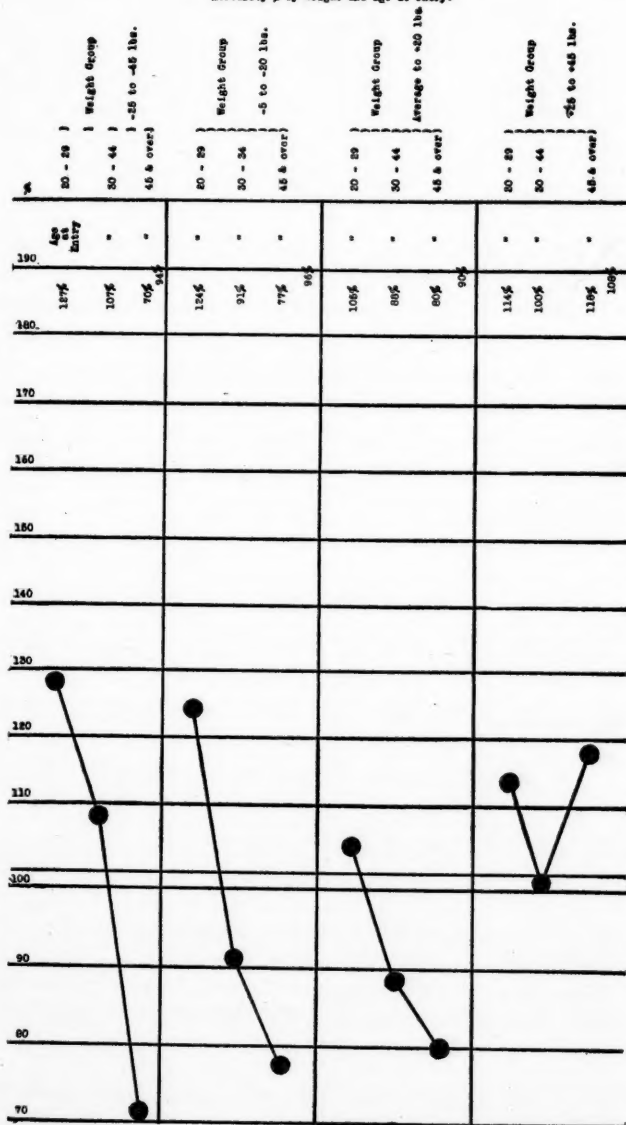
MEDICO ACTUARIAL REPORT
TUBERCULOSIS IN ONE BROTHER OR SISTER
Mortality % by weight and age at entry.



MEDICO ACTUARIAL REPORT

TUBERCULOSIS IN ONE PARENT.

Mortality % by weight and age at entry.



84 Twenty-Eighth Annual Meeting

MED. IMP. CLASSES 53 & 55—ONE PARENT OR BROTHER OR SISTER DEAD OF TUBERCULOSIS

Age at Entry	No. of Entrants	Exposures	Deaths			Total Experience Ratio
			Actual	Expected	Ratio	
15-29	2,464	6,841	32	28.622	112.0	
30-39	1,741	5,118	19	24.317	78.3	
40-49	964	2,908	14	21.055	66.4	
50-59	346	1,040	7	15.486	45.2	
60 & Ov.	44	144	4	4.996	80.0	
Total	5,559	16,051	76	94.476	80.6	

Dr. Gage—If there is no further discussion of Dr. Toulmin's paper, I will ask Dr. Toulmin to say something in closing.

Dr. Toulmin—It might be interesting to know that in our Company there probably were more cases of tuberculosis not reported as such in the family history than almost in any other company. During the period when these entrants became policy holders the agent took the family history. In recent years, the Medical Examiner has taken the family history.

Dr. A. S. Knight then read the following paper entitled:

THE RELATION OF CANCER TO ECONOMIC CONDITION

THE INCIDENCE OF CANCER IN THE ORDINARY, INTERMEDIATE, AND INDUSTRIAL DEPARTMENTS OF THE METROPOLITAN LIFE INSURANCE COMPANY, COMPARED

BY

AUGUSTUS S. KNIGHT, M.D., *Medical Director*

AND

LOUIS I. DUBLIN, PH.D. *Statistician*

Cancer is not only of great and increasing public interest, but is more and more engaging the attention of insurance men. In the period 1914 to 1916 cancer caused about 7% of all the deaths in the Ordinary department of the Metro-

Knight—Cancer and Economic Condition 85

politan Life Insurance Company. When we consider specific age periods we find the proportions even higher; thus, cancer caused 11.7% of all the male deaths in the Ordinary department in the age period 55 to 64, and 21.5% of all the deaths among females in the age period 45 to 54. It would seem, therefore, that anything which we can add from insurance sources to the body of reliable information on cancer would be welcomed by the medical profession. This is especially so in view of the fact that the disease is presenting so many difficulties to the expert laboratory and research workers who are engaged in determining its etiology. Direct modes of attack including clinical observations have to date proved futile; and as a result efforts are being put into the investigation of some of the characteristics of cancer, such as its incidence by age, sex, color, race, occupation, social condition, in the hope that some light may be thrown on its nature or that some suggestion may be obtained which may later guide laboratory workers in determining the true cause. In fact, some of the most promising lines of recent research have resulted from the analysis of the data compiled by medical statisticians.

In this discussion, we shall limit ourselves generally to one specific question, which the material at our disposal would seem to permit us to answer, namely, what is the relation of cancer to economic condition? Is the cancer rate higher or lower in the several main economic groups of the population? In the Metropolitan Life Insurance Company, we have the data for three large insurance groups at our disposal, namely, the Ordinary, Intermediate, and Industrial which correspond roughly to three distinct economic strata of the population. The first is the most prosperous class with an outstanding average amount per policy of \$1506. The second group, or Intermediate, is composed for the most part of the better circumstanced working people who receive more than average wages and are able to buy their insurance in units of \$500 and pay for the same quarterly, semi-annually or annually. The third group, or Industrial, stands clearly

86 Twenty-Eighth Annual Meeting

outlined as representative of the working population of America who pay for their insurance through weekly premiums of five cents or multiples thereof. It is our purpose then to compare the incidence of cancer in these three groups to determine whether there are any real and significant differences which can be related to differences in economic condition. To this end, a full display both of the exposed to risk and of the number of claims paid are fortunately at our disposal.

TABLE I

CANCER CLAIMS AND CLAIM RATES PER HUNDRED THOUSAND MEAN IN FORCE—ORDINARY, INTERMEDIATE, AND INDUSTRIAL DEPARTMENTS COMPARED—ALL YEARS OF ISSUE COMBINED—COMPOSITE MORTALITY EXPERIENCE 1914, 1915, AND 1916—WHITE LIVES—BY SEX AND BY AGE PERIOD

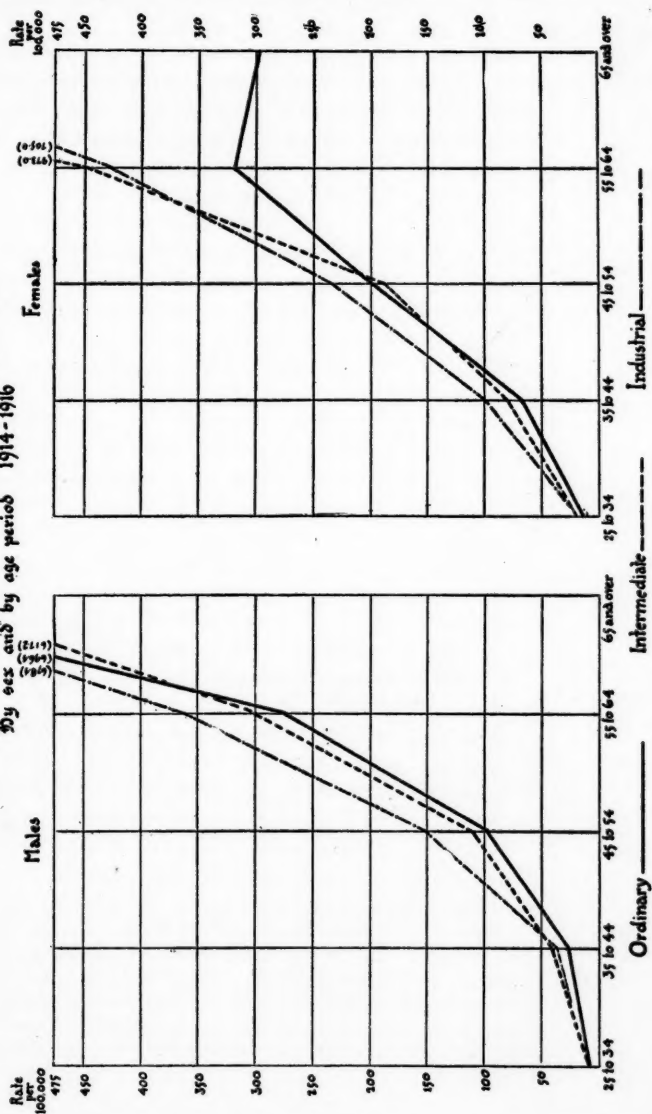
SEX AND AGE PERIOD	ORDINARY DEPARTMENT		INTERMEDIATE DEPARTMENT		INDUSTRIAL DEPARTMENT*	
	<i>Claims</i>	<i>Rate per 100,000</i>	<i>Claims</i>	<i>Rate per 100,000</i>	<i>Claims</i>	<i>Rate per 100,000</i>
Males						
Ages 25 & over	757	54.7	562	54.9	8674	140.0
25 to 34	40	7.3	35	7.3	219	9.7
35 to 44	128	26.7	127	39.2	566	37.5
45 to 54	245	95.2	172	110.0	1750	154.1
55 to 64	229	275.2	163	301.5	3081	368.0
65 & over	115	696.4	65	617.2	3058	679.2
Females						
Ages 25 & over	103	91.2	443	87.0	19,745	197.7
25 to 34	6	13.5	43	17.8	567	17.8
35 to 44	24	64.1	134	79.6	2466	98.9
45 to 54	41	196.5	142	188.7	4840	235.8
55 to 64	24	318.5	93	445.7	6326	429.6
65 & over	8	298.6	31	973.0	5546	707.5

* For the Industrial department there were available also both the number of deaths and an estimated number of policyholders. The result-

Metropolitan Life Insurance Company

Claim Rates per 100,000 Cancer (all forms)
Ordinary Dept., Intermediate Branch and Industrial Dept.

By sex and by age period 1914-1916



88 Twenty-Eighth Annual Meeting

Table I shows the number of claims and the claim rates per hundred thousand mean in force in the three departments, distinguished by sex and by age period. The table is based on all years of issue combined in the composite mortality experience of the three years 1914, 1915, and 1916.

The males present by far the more conclusive evidence because the number of death claims and the number of persons exposed in each one of the three divisions are adequate for discussion. In general, we may say that the lowest rates by age period are found in the Ordinary department, the highest rates in the Industrial department and the intermediate rates in the Intermediate department. The Intermediate cancer figures tend to approach those of the Ordinary department more than the rates of the Industrial department. This condition is shown clearly in the accompanying graph. The differences in the three sets of rates are clearly defined during the main cancer period of life, *i.e.*, after age 45. The figures for the age period 55-64 may be singled out for special notice. The Ordinary cancer rate is 275.2 per hundred thousand, the Intermediate rate, 301.5 and the Industrial rate 368.0. The number of death claims in each group and the number of those exposed to risk are in each case large enough to assure safe statistical results.

The smaller number of females exposed to risk in the Ordinary and in the Intermediate departments cause the rates at the various age periods to fluctuate somewhat. The evidence, while not so decisive, points nevertheless in the same direction as for males. As will be evident from the graph, the Industrial figures are clearly the highest throughout the main period of life; the Ordinary the least and the Intermediate

ing cancer death rates for each sex and for the several age periods are strikingly similar to the claim rates shown above. It was decided, therefore, to present the claim rates at this time in view of the fact that no death rates are available for either the Ordinary or the Intermediate departments. The three sets of figures presented are thus essentially comparable and may safely be held to represent the facts of the true cancer mortality in the three groups.

Knight—Cancer and Economic Condition 89

somewhat between. The aberrantly low rate for the Ordinary department at ages 65 and over, namely, 298.6 per 100,000 is clearly the result of the small exposure at that age period. A similar reservation may be made for the rate in the Intermediate department for the same age period, 65 and over. In this case, the rate is probably somewhat higher than if a larger number of cases had been under observation or if a larger number of years of experience had been combined. In the Industrial department the figures are extremely regular because of the very large exposure which amounts to several million lives.

It is, in our judgment, therefore, fairly safe to conclude from the above figures that the highest cancer mortality rates are found among the Industrial population, that the least are to be observed among the Ordinary and that the Intermediate department shows a cancer rate which is between that of the Ordinary and the Industrial. In terms of economic status we may say that the incidence of cancer would seem on its face to be most highly represented in the poorest groups of the population and that the rate decreases as we approach the more prosperous people and that this is generally true of both sexes and at most of the age periods.

This conclusion, we admit, is decidedly contrary to the prevailing opinion which we have gleaned from the cancer literature. Hoffman,¹ analyzing the proportionate mortality of cancer in the experience of the Prudential Insurance Company of America, concluded that the incidence of cancer is higher among the prosperous and well-to-do and lower among the less prosperous and the poor. Williams,² likewise, came to the conclusion that the cancer rate was low among the poor. Theilhaber³ came to a similar conclusion on the basis

¹ Hoffman, Frederick L. "Mortality from Cancer throughout the World," p. 101.

² Williams, W. Roger. "The Natural History of Cancer." (Numerous references throughout this work.)

³ Theilhaber, Adolf. "Der Einfluss der sozialen Lage auf die Entstehung von Geschwülsten." *Krankheit und Soziale Lage*, 1913, vol. 2, p. 608.

of cases in Munich, making reservation, however, as to women of the poorer classes where the cancer rate, he thought, was higher than for prosperous groups. On the basis of English figures, Heron,¹ likewise, arrived at the conclusion that prosperity and culture were conducive to a high cancer death rate.

Other writers, including Maynard,² have been more cautious in relating poverty and low cancer death rates, while a few writers and more especially Hoeber,³ have maintained that cancer as well as tuberculosis were more prevalent among the poorer populations. There is, therefore, a difference of opinion among the authorities on this point with the majority in favor of a correlation between prosperity and a high cancer death rate.

We have examined much of this controversial material and have concluded that the prevailing judgment as to cancer and economic condition is based in large part on personal impression or on insufficient evidence. Thus, the statistical material presented by Hoffman⁴ of the Prudential is not conclusive for present purposes, since it is limited to a comparison of the proportion of cancer deaths among all deaths in the Ordinary and Industrial departments of his Company, respectively. He found in the age period 45 and over, among males, that 8.5% of all deaths in the Ordinary department were due to cancer, while in the Industrial department the corresponding figure was only 6.6%. Among females, the two figures were 17.8% and 11.7%, respectively, in the Ordinary and Industrial departments. Similar figures are available for the Metropolitan and are presented below.

¹ Heron, David. "On the Relation of Fertility in Man to Social Status," London. Dulau and Co., 1906.

² Maynard, B. D. "A Statistical Study in Cancer Death Rates." *Biometrika*, Apr. 1910, vol. viii, Pt. iii, p. 276.

³ Hoeber, W. R. "Relation of Soil to Tumor Growth." *Zeitschrift für Krebs forschung*, Jena. 1904. p. 173. See also review in *Journal American Medical Ass'n*, Mar. 26, 1904.

⁴ *Op. cit.*

Knight—Cancer and Economic Condition 91

TABLE II

NUMBER OF CANCER CLAIMS AND PROPORTION OF CANCER CLAIMS TO TOTAL ORDINARY, INTERMEDIATE, AND INDUSTRIAL DEPARTMENTS COMPARED—ALL YEARS OF ISSUE COMBINED—COMPOSITE MORTALITY EXPERIENCE 1914, 1915, AND 1916—WHITE LIVES, BY SEX AND AGE PERIOD

SEX AND AGE PERIOD	NO. OF CLAIMS ALL CAUSES			NO. OF CANCER CLAIMS			% CANCER OF CLAIMS ALL CAUSES		
	Ord.	Int.	Ind.	Ord.	Int.	Ind.	Ord.	Int.	Ind.
Males									
Ages 25& over	10461	10970	173289	757	562	8674	7.2	5.1	5.0
25 to 34	2277	2805	20563	40	35	219	1.8	1.2	1.1
35 to 44	2435	2953	22213	128	127	566	5.3	4.3	2.5
45 to 54	2709	2553	28911	245	172	1750	9.0	6.7	6.1
55 to 64	1963	1876	41930	229	163	3081	11.7	8.7	7.3
65 & over	1077	783	59672	115	65	3058	10.7	8.3	5.1
Females									
Ages 25& over	810	3563	142405	103	443	19745	12.7	12.4	13.9
25 to 34	134	1141	19904	6	43	567	4.5	3.8	2.8
35 to 44	181	992	23188	24	134	2466	13.3	13.5	10.6
45 to 54	191	777	26468	41	142	4840	21.5	18.3	18.3
55 to 64	151	474	33144	24	93	6326	15.9	19.6	19.1
65 & over	153	179	39701	8	31	5546	5.2	17.3	14.0

We find, likewise, in our Ordinary experience the highest proportion of cancer to all causes, the least in the Industrial. This finding, however, is in no sense a contradiction to the facts shown in Table I which are in themselves conclusive. The explanation is simple. The mortality of the Ordinary department is low for all causes combined; the mortality in the Industrial department is higher than in the Ordinary department at every age period. The proportion of cancer to all causes is only a measure of the relative importance of cancer and is not at all an index of its true incidence. A low death rate from tuberculosis and from accidents is found in

the Ordinary department and this has the effect of raising the proportionate mortality of cancer, whereas the high mortality from tuberculosis and accidents in the Industrial department lowers the proportion of cancer. In other words, the proportionate method is extremely unreliable for present purposes and presents a distorted picture. Reliance can be placed only upon rates such as are presented in our Table I in which the actual number of policies exposed as well as the death claims are considered in relation to each other.

In a similar manner, the evidence of the other writers in favor of a high mortality among the more prosperous groups can be shown to be more or less technically defective. In fact, no good evidence has up to the present appeared in the literature which would justify any conclusion with reference to the relation of cancer to economic grade. The figures of this study are presented with due caution as an attempt to meet the chief requirements which would permit a conclusion to be drawn on this subject.

The cancer death rates we have quoted in these comparisons of the Metropolitan experience were based upon the aggregate mortality, that is, on the experience of all policy years combined. It may be argued that the influence of medical selection may have been effective in producing more favorable Ordinary and Intermediate cancer death rates. The Industrial business, it must be remembered, is, for the most part, only medically inspected and is not subject to much if any cancer mortality saving from medical selection during the early years of issue as is supposed to be the case in the Ordinary and Intermediate departments. To test out this assumption, we have eliminated the first five years of issue from our Ordinary and Intermediate tables and have compared these new and ultimate rates with the industrial aggregate experience. The following table presents the figures in the comparison:

Knight—Cancer and Economic Condition 93

TABLE III

CANCER CLAIM RATES PER 100,000 MEAN INFORCE—ORDINARY AND INTERMEDIATE DEPARTMENTS FIRST FIVE YEARS OF ISSUE EXCLUDED—COMPARED WITH INDUSTRIAL DEPARTMENT ALL YEARS OF ISSUE COMBINED—COMPOSITE MORTALITY EXPERIENCE 1914, 1915, AND 1916—WHITE LIVES BY SEX AND AGE PERIOD

<i>Sex and Age Period</i>	<i>Ordinary</i>	<i>Intermediate</i>	<i>Industrial</i>
Males:			
Ages 25 & over	83.5	70.3	140.0
25 to 34	12.0	8.7	9.7
35 to 44	33.4	41.8	37.5
45 to 54	104.3	107.6	154.1
55 to 64	276.5	295.1	368.0
65 & over	662.5	645.3	679.2
Females:			
Ages 25 & over	141.6	115.1	197.7
25 to 34	31.4	25.4	17.8
35 to 44	71.6	87.8	98.9
45 to 54	213.5	206.7	235.8
55 to 64	353.6	422.1	429.6
65 & over	313.1	1009.8	707.5

We find again that the figures for the Industrial department are higher and that the differences are most marked at the age periods when the cancer death rate is most significant, namely, between 45 and 65. This is equally true for both sexes. In other words, industrial mortality from cancer is highest even when the effect of medical selection for the first five years of issues is eliminated from the Ordinary and Intermediate rates.

The subject of medical selection having thus been introduced into our discussion it will be of interest to you, even though it be a digression from our main topic, to have us consider this question in a little greater detail. What is, indeed, the effect of medical selection during the first few years of issue on cancer mortality in the Ordinary and Intermediate departments?

94 Twenty-Eighth Annual Meeting

To answer this question, we have at hand two sets of figures: (a) the select experience with the latest five years of issue excluded, and (b) the experience for the latest five years of issue alone. We can make this comparison in both the Ordinary and Intermediate departments. The following table presents the figures for the old and new business, respectively, in both the departments.

TABLE IV

CANCER CLAIM RATES PER 100,000. ALL YEARS OF ISSUE WITH FIRST FIVE YEARS EXCLUDED, COMPARED WITH FIRST FIVE YEARS OF ISSUE ONLY. ORDINARY DEPARTMENT AND INTERMEDIATE BRANCH, COMPOSITE EXPERIENCE OF 1914, 1915, AND 1916. WHITE LIVES BY SEX AND AGE PERIOD

SEX AND AGE PERIOD	ORDINARY DEPARTMENT		INTERMEDIATE DEPARTMENT	
	<i>All Years of Issue except First Five Years</i>	<i>First Five Years of Issue</i>	<i>All Years of Issue except First five Years</i>	<i>First Five Years of Issue</i>
Males:				
Ages 25 & over	83.5	24.2	70.3	35.3
25 to 34	12.0	5.1	8.7	6.1
35 to 44	33.4	18.1	41.8	35.4
45 to 54	104.3	72.3	107.6	115.5
55 to 64	276.5	268.8	295.1	323.8
65 & over	662.5	1162.8	645.3	325.0
Females:				
Ages 25 & over	141.6	43.3	115.1	45.3
25 to 34	31.4	6.3	25.4	11.0
35 to 44	71.6	55.8	87.8	63.1
45 to 54	213.5	161.5	206.7	134.0
55 to 64	353.6	152.1	422.1	581.2
65 & over	313.1	....	1009.8	465.1

In the Ordinary department the effect of medical selection appears to be considerable at the ages under 55. Among males

Knight—Cancer and Economic Condition 95

below age 45 the rates for the first five years of issue are about half the rates for the ultimate experience. In the age period 45 to 54, the rate for the first 5 years of issue is 69 per cent. of the rate for business older than five years. This still indicates a considerable saving.

At the age period 55 to 64, however, the figures are virtually the same for the two groups, indicating that the same ratio in effectiveness of medical selection does not hold at the older age periods as in the younger ones. Among females in the Ordinary department, the figures for the recent issues are in every case lower than for the older issues but the number of exposures during the first five years of issue is so small as to justify no far-reaching conclusions.

In the Intermediate department, the situation is somewhat different. We find among males that the favorable differences between the new and old business are slight and these are limited to the ages under 44. After 45, the rates for males are higher for the new issues than for the older ones although the differences are not marked. Similar findings are to be observed among the Intermediate females. We may, therefore, say that in the Intermediate department of the Company the effect of medical selection is not as great as that found in the Ordinary department and is entirely limited to the younger ages. This is consistent with our expectation since medical examination against cancer in the Intermediate department is of a less rigid character than in the Ordinary department.

To satisfy ourselves still further of the effectiveness of medical selection during the first five years of policy duration, we have analyzed our experience to determine approximately when during this period the medical selection begins to wear off. From the figures at hand it would appear that whatever saving there is during the first five years is accomplished during the first and perhaps during the second calendar years. Thereafter, that is, during the third, fourth, and fifth years, the saving is unimportant. This is equally true for both Ordinary and Intermediate departments so far as our figures indicate.

96 Twenty-Eighth Annual Meeting

We may conclude this discussion as follows:

1. The current opinion that there is a positive correlation between poverty and a low cancer rate is in all probability unfounded.
2. The cancer rate increases as we go down in the economic scale.
3. This is true for both sexes and by age period where sufficient data are available.
4. The conclusion drawn from our figures is not conditioned by the effect of varying amount of medical selection in the three groups considered.
5. Medical selection against cancer is most effective in the Ordinary department and is limited to the earlier ages and to the early years of issue.
6. In both Ordinary and Intermediate departments the effect of medical selection against cancer is limited to the first and perhaps the second year of issue.

Dr. Gage—I will ask Dr. Wells to open the discussions of Dr. Knight's paper.

Dr. Wells—I regret that I cannot discuss this paper from a statistical standpoint. As I did not see a copy of it until late on Saturday, I have had no opportunity to go over even our own statistics.

From the classes which they have in the Metropolitan, Dr. Knight has certainly had a wonderful opportunity for discussing such a subject as this.

The subject of cancer is one of the most important, from an insurance standpoint, that we have to consider. It is stated by a competent authority connected with the United States Statistical Department that the annual death rate from cancer among civilized people in the world to-day is over half a million. That it is increasing very fast and progressively affecting the younger ages. It is certainly a great world problem, to say nothing of the insurance field, because it may have a

very decided effect on our mortality statistics. It still further presents many interesting problems to life insurance people. Is it preventable? Is it contagious? The theory is advanced that it is. Is it inherited? Is it in certain foods? Have food values and food relations an effect on the disease? Has environment any influence?

Another important point is that of early diagnosis. Our experience in the Equitable shows that we are having a very considerable increase in cancer death claims, leading us to believe that during the first few years of selection, and especially among women, our mortality statistics from cancer have evidenced a very decided increase. Consequently, early diagnosis is very important, especially from a medical insurance standpoint.

Another important question is, is there a permanent cure? Lastly, the point which has been brought out as to the class of people affected. Here is one point where statistics seem to come to our aid. In acute diseases the collection of statistics and data is comparatively easy, especially if the disease attacks almost solely one period of life, say childhood; but with the increase in the duration of illness before death, the difficulty of statistical information increases. These statistics depend upon diagnosis. How correct are the diagnoses? This leads me to ask Dr. Knight a question regarding the death claims which come to his Company in these different classes, the Ordinary, the Intermediate, the Industrial, and the Extra Hazardous. For instance, a claim comes in that a policyholder in the Industrial class has died of cancer. How correct is that diagnosis? A few years ago, I attended the American Life Convention at French Lick, at which time Dr. Wilson of the Mayo Laboratory read a very interesting paper on the value of autopsies in relation to life insurance. He brought out the fact of the very few autopsies obtainable in this country, and called attention to the danger of mistaken diagnoses, especially in ulcer of the stomach and in cancer. A diagnosis can only practically be confirmed by autopsy. These we seldom have in this country. Consequently, when a death oc-

curs, a doctor may diagnose the case as cancer, perhaps of the stomach or of the intestine. Was it of the stomach, of the liver, of the intestine, or was it *really cancer*? There is a wide difference in opinion. Dr. Knight has referred to the difference of opinion in regard to the relation of cancer to the Ordinary and to the Industrial classes. It is held on good authority that the mortality from this disease is less where the struggle for existence is the hardest. Dr. Senn of Chicago took the view, that among the poorer classes, cancer was more prevalent. Dr. Murphy took the opposite view, that cancer was more prevalent and increasing more rapidly among the well-to-do. Dr. J. D. Prince of New York took the ground that it was more prevalent among the poor. So there seems to be a wide difference of opinion. Still further, it is shown that the density of population has an effect; where the birth rate is highest, the average duration of life shortest, and where sanitation is least perfect. Authorities differ also along this line. We have heard that to-day Dr. Roger Williams, of London, finds the cancer rate lowest among the poor or the Industrial classes; whereas among the cultured classes, high living, rich food, ease and luxury are very conducive to the disease. You will find, if you consult the Bureau of Statistics of our own government, that cancer is on the increase in this country. Last year, 59,000 deaths were recorded as from cancer in the registration area alone and it is claimed by Hoffman and others that this would reach 80,000 as the 59,000 reported to the government covered simply the registration area. We know also that no race is immune. In Africa, in the South Sea Islands, in Japan and China, and in India, cancer is on the increase. Our own experience shows that deaths from cancer, of policyholders, from 1906 to 1915, numbered 169, or twenty-eight per hundred thousand exposures. Two or three years ago I investigated the mortality experience for the Workman's Sick and Death Benefit Association. This Association, as you know, has been in existence since 1885. The material covered 419 policy years, representing 50,000 cases; cancer deaths, 215. I suppose this Workman's Sick and Death Benefit Association

would correspond in membership to about the Metropolitan's "Intermediate Class."

I am glad that the paper under discussion shows the fallacy of giving death rates in per cent. of total deaths, instead of giving them in a ratio to lives exposed. For illustration: supposing a town of 100,000 population has 100 deaths in a given year, 20 from tuberculosis, 20 from circulatory diseases, etc., meaning a death rate of 20% from tuberculosis, and 20% from circulatory diseases, if expressed in per cent. of all deaths. If these deaths are expressed in relation to persons living, we say 20 per 100,000 as a tuberculosis death rate, and the same for circulatory diseases. Assuming now that the next year the population remain the same, also the deaths from tuberculosis and circulatory diseases, etc. but that a flood drowns 100 inhabitants and increases the total deaths to 200. What is the result? Twenty deaths from tuberculosis or circulatory diseases in a total of 200 deaths would mean a rate of only 10% for tuberculosis and also for circulatory diseases, although the death incidence from these diseases had been exactly the same as in the year before; that is, 20 per 100,000 population. We cannot urge too strongly the greatest caution, if deaths are expressed in per cent. of total deaths.

It is also reasonable to suppose that the wealthier classes enjoy better facilities for the prevention of cancer, not only in this country, but everywhere. I think that circumstance is a common sense one, regardless of statistics; that the poorer classes do not have the facilities, nor do they give themselves the same careful attention, so that a disease, such as this, will progress insidiously, before it is apparent. Deaths occur, without medical or surgical attention, and, I believe, it stands to reason that the poorer classes are thus more susceptible in that respect.

With reference to the tables submitted by the Metropolitan, the Ordinary Life are, of course, subjected to a more careful medical examination than the Industrial. The Industrial have simply a medical inspection, rather than a medical ex-

100 Twenty-Eighth Annual Meeting

amination. Consequently, with an Ordinary class, carefully examined, some would be excluded where a tendency to cancer or some other disease was apparent. Therefore, they are put in some of the other classes. I think this is in line with reason, and seems to be borne out by the experience of the Metropolitan.

Dr. Gage—Dr. Knight's paper is open for further discussion.

Dr. Porter—Believing that further statistical information on cancer mortality would be of interest to the members of the Medical Directors Association, I take pleasure in presenting the results of the Mutual Life Insurance Company, on this subject.

The deaths from cancer contained in the discussion covers a period of eighteen years, from 1899 to 1916 inclusive, and is a continuation of the experience published in 1900, which covered the years 1843 to 1898 inclusive. During the years 1899 to 1916, there have been 5,916 deaths from cancer, or 6.3% of all the deaths among men, and 822 deaths from the same cause among women, which is 12.7% of all the female deaths. During the three years, 1914 to 1916 inclusive, the same period covered by the Metropolitan statistics, there have been 1,359 male deaths from cancer or 7.5% of all the male deaths, and 182 female deaths from the same cause, or 14.9% of all the female deaths. These percentages in the period 1914 to 1916 are larger than in the period of 1899 to 1916, and are almost double as compared with the early period 1843 to 1898, which showed a proportion of cancer to the total deaths from all causes of 4.2% and 8.3% for men and women respectively.

THE FOLLOWING TABLE A SHOWS THE DEATHS FROM ALL CAUSES AND FROM CANCER, WITH THE PERCENTAGES, ARRANGED IN QUINQUENNIAL GROUP-AGES AT DEATH FOR THE YEARS 1899 TO 1916 INCLUSIVE.

MEN				WOMEN		
Ages at Death	Deaths from all Causes	Deaths from Cancer	Percentage of total Deaths	Deaths from all Causes	Deaths from Cancer	Percentage of total Deaths
Under 20	237	3	1.27	17	—	—
20-24	1,481	14	.95	136	2	1.47
25-29	3,185	47	1.47	358	4	1.12
30-34	4,769	90	1.89	552	19	3.44
35-39	6,675	204	3.06	641	55	8.58
40-44	8,387	413	4.91	722	98	13.62
45-49	9,658	581	6.04	713	136	19.04
50-54	10,482	896	8.55	661	138	20.84
55-59	10,580	919	8.68	632	138	21.80
60-64	10,053	919	9.14	629	94	14.95
65-69	9,389	709	7.52	568	73	12.85
70-74	7,933	570	7.18	448	40	8.92
75-79	6,021	355	5.89	297	16	5.39
80-84	3,683	138	3.75	173	7	4.05
85-89	1,491	52	3.49	63	2	3.18
90 & Ov.	383	6	1.57	16	—	—
Total	94,407	5,916	6.27	6,626	822	12.41

We note that this disease is very rare in the early ages, but beginning with age thirty, the deaths and percentages increase steadily to age sixty-five for men and to age sixty for women. After these respective ages the percentages diminish though retaining considerable importance up to extreme old age.

The exposures for the same period and ages are not available and therefore the death rate from cancer to the number exposed could not be obtained for comparison with the Metropolitan figures given in Table I. In Table II however, the Metropolitan shows the proportion of cancer to total claims. Accordingly the experience of the Mutual during the three years 1914 to 1916 is given in Table B together with the figures of the Metropolitan.

TABLE B

MEN

MUTUAL				METROPOLITAN ORDINARY		
Ages at Death	Deaths from all Causes	Deaths from Cancer	Percentage of total Deaths	Claims from all Causes	Claims from Cancer	Percentage of total Deaths
25-34	1,031	31	3.0	2,277	40	1.8
35-44	2,337	122	5.2	2,435	128	5.3
45-54	3,885	318	8.2	2,709	245	9.0
55-64	4,473	413	9.3	1,963	229	11.7
65 & Ov.	6,339	475	7.5	1,077	115	10.7
Total	18,065	1,359	7.5	10,461	757	7.2

WOMEN

25-34	85	2	2.4	134	6	4.5
35-44	222	28	12.6	181	24	13.3
45-54	296	71	24.0	191	41	21.5
55-64	258	50	19.4	151	24	15.9
65 & Ov.	363	31	8.5	153	8	5.2
Total	1,224	182	14.9	810	103	12.7

On the whole the cancer incidence in the two Companies is about the same in case of men, the percentage of cancer to total deaths from all causes being 7.5% for the Mutual and 7.2% for the Metropolitan. Comparing the different age periods, the Mutual shows a higher percentage in the decade 25-34 but a lower percentage at the subsequent decades. In the case of women the total percentage is somewhat higher in the Mutual, being 14.9% as against 12.7% for the Metropolitan. The Mutual shows a lower percentage in the first two decades, 25-44 but higher after that age.

EXPERIENCE OF THE MUTUAL LIFE INSURANCE COMPANY
OF NEW YORK

DEATHS FROM ALL CAUSES, AND FROM CANCER, WITH THE
PERCENTAGE, IN QUINQUENNIAL AGE GROUPS FOR THE
YEARS 1899 TO 1916 INCL.

Ages at Death	MEN			WOMEN		
	Deaths from all Causes	Deaths from Cancer	Percentage of total Deaths	Deaths from all Causes	Deaths from Cancer	Percentage of total Deaths
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85-89	1,491	52	3.49	63	2	3.18
90 & Ov.	383	6	1.57	16	—	—
Total	94,407	5,916	6.27	6,626	822	12.41

Oct. 9, 1917.

Dr. Stebbins—I was somewhat surprised to learn that the mortality was greater in earlier life than in later life, in cancer, which does not agree with my personal observation. It only goes to show that there is a very great difference of opinion, whether from statistics or from personal observation. In my personal experience, in a vast majority of cases, over a somewhat extended period, the mortality was found greater between the fifteen years from 50 to 65, and in personal observation of some twenty cases occurring in my own practice, where post

mortems were made, the diagnosis were confirmed by autopsies. They were between those ages. And in the history of the Civil War, I happened to make, in conjunction with Dr. Dean, post mortems for the Lincoln Hospital in Washington, for two or three months in 1864, and we had from fifteen to thirty autopsies a day. Ninety of those cases are reported in the medical and surgical history of the war. We had to take every organ of the body and examine every portion of it, and make a report, and it was extremely rare that we found any cancerous degeneration in any organ of the body. Of course these were men from the ages of twenty to thirty-five. But when men like Murphy and Senn differ in their views, the question arises, how much value can you actually place upon statistics. In the industrial class, oftentimes a physician will be called to make a visit, and not be sure that he will ever be called again, so that in later life and among the well-to-do prosperous classes, you have a more continued observation, and a chance to confirm by autopsy. It seems to me that there is every reason why cancer should develop in the prosperous as against the industrial, and I am very much surprised to learn from these observations of others that this is not so.

Dr. Gage—If there is no further discussion, I will ask Dr. Knight to close.

Dr. Knight—While it is no doubt true that years ago the diagnoses on Industrial claim papers were less correct and less complete than on the Ordinaries, yet I am very certain that nothing of the kind is true to-day, for one of the best lines of work that our statistical department has been doing ever since its establishment, has been along the line of insisting upon and obtaining a full and complete statement from the attending physician. The Bureau has been constantly in touch with the Federal Registration Bureau, has had experts from it at work in our Home Office, teaching our men, has even employed experts that were previously employed by it, and has developed a system by which attending physicians are written to, whenever the claim papers appear to be incomplete or incorrect or doubtful, and it has been gratifying as well as

Rowley—Goitre in Relation to Insurance 105

surprising to see how those physicians have welcomed correspondence, how interested they have been in the final decisions, and how they have coöperated with us to make their statements correct and complete.

Dr. Gage—I think we will ask Dr. Rowley to read his paper on Goitre, and then to-morrow morning we will have the discussion of Dr. Rowley's paper, the report of the Committee on Blood Pressure, which is to include, I believe, a special report on diastolic pressure, and then the reading of Dr. Mackenzie's paper, which will give us a morning largely devoted to circulatory impairments.

Dr. Robert L. Rowley read the following paper, entitled:

GOITRE IN RELATION TO LIFE INSURANCE

ROBERT L. ROWLEY, M.D.

Medical Director, Phœnix Mutual Life Insurance Co.

When our President, Dr. Gage, honored me with an invitation to prepare a short paper for this meeting I had considerable difficulty in choosing a subject that would enable me to contribute something of merit to the proceedings of this Society. Had I been able to foresee the difficulties and disappointments that beset my every effort to find some material for a paper of scientific value, which was to be gotten together in the short time at my disposal, I would certainly have faltered at the beginning. The records at our office seemed to offer nothing of striking interest, and the difficulty in obtaining clerical assistance was another factor that deterred me from undertaking any elaborate piece of work.

In selecting "Goitre" as the topic for my remarks, I must admit a somewhat selfish motive, for I had long desired to

clarify my own ideas as to the proper relationship of this disease to life insurance. It is a matter of deep personal regret that I am unable at this time to offer a statistical report on the mortality and the morbidity of persons who have been under treatment, medical or surgical, for this disease. One can easily learn the so-called operative mortality of these cases, but soon runs into difficulties of no mean proportions if he attempts to go much further.

The operative mortality is, of course, of interest to the surgeon, but much less so to insurance companies whose contact with these cases is usually at a considerable period of time after they have passed out of medical or surgical observation.

At our office it has seemed to us that the number of applicants with a goitre history or present evidence of goitre, while not large, was increasing to a considerable extent—probably a natural consequence of the increasing business on the lives of women. At any rate, we have found ourselves often in a position of embarrassment resulting from a lack of definite knowledge how properly to dispose of these cases. To decline them all was, of course, an easy matter, and with few exceptions that has been our practice. But is this practice a wise one from a business standpoint? Perhaps some of our members representing the larger companies can answer this question for us with facts based upon their own records. At all events, I am led to expect that the Medico-Actuarial Committee will some day be able to furnish us with some definite information on this subject. It will be a big piece of work requiring much time, labor and expense.

It was my ambition to do something along such lines in the preparation of this paper, but after my views of the problem had elevated me to a better perspective, I decided that, as discretion was the better part of valor, there was but one way open to me and I was forced to beat a retreat.

Not to be dismayed, however, I have turned my attention to a review of the recent literature in the hope of finding some personal reward and presenting something that will be worthy of our consideration at this time.

Rowley—Goitre in Relation to Insurance 107

The problem of the causation of goitre is one which has exercised the minds of observers since the earliest days of medical history. There are indeed few diseases about which so much has been written and so many diverse views propounded.

For a student of the subject, perhaps one of the most onerous tasks is the sifting of the enormous mass of evidence which has been brought forward by the supporters of different theories. He finds early in his study that the greater part of the evidence is purely circumstantial, and that the literature of the subject consists to a great extent, rather in records of impressions and opinions of observers than in scientifically proven facts. The separation of the wheat of fact from the chaff of fancy is consequently a matter of considerable difficulty.

A review of the more recent scientific work cannot fail to impress one with the increasing tendency to a departure from the older chemical theories and the large amount of evidence in support of the theory that the causative agent of this disease is of an infectious nature.

The conclusion to be drawn from experimental research is that numerous infections, not of the thyroid gland itself as much as of the body in general, effect a change in the pathology of the gland.

The examination under different conditions of the thyroids of man and of many animals has shown that infections produce microscopic pictures indistinguishable on the one hand from chronic colloid hypertrophy and hyperplasia, and on the other from acute cellular hyperplasia and rapid colloid absorption as seen in exophthalmic goitre. Not all infections act alike. For instance, some have been found to produce very little or no hyperplasia, while the most exuberant cellular activity has been seen in acute infections of, or experimental injections with, coliform bacilli, diphtheria bacilli, micrococcus catarrhalis, and about a dozen other commonly met with organisms, including the tubercle bacillus.

Other infections have been shown to produce more moderate hyperplastic changes, and clinically such changes represent goitres of moderate toxicity and less acuteness of development.

The fact that exophthalmic goitre and acute hyperplasia of infectious origin have one and the same microscopic appearance does not, of course, permit of drawing the conclusion that exophthalmic goitre is due to infection.

The change of the gland may be caused by more than one form of stimulation. For example, Bayon¹ has shown that all stages of simple goitre can be produced in various ways by experiment: (1) by ligaturing the thyroid artery; (2) by the injection of an emulsion of soot in sterile water into the thyroid gland; (3) by the injection of typhoid toxins into the gland; (4) by poisoning with phosphorous. As a result of his experimental work, he has concluded that "any cause which is capable of altering the function of the thyroid so as to damage its secretory epithelium can lead up to the production of colloid, diffuse or nodular goitre."

Within the past few years, the theory of bacterial toxic origin of thyroid disease has been brought into prominence by the important work of Farrant² and also that of McCarrison,³ of the Indian Medical Service. As amœbic intestinal infection was prevalent in the district where McCarrison was located, he examined the fæces of his goitre patients, to determine if there was any relation between the presence of amœbæ and the formation of goitre.

He found a bacillary growth in his cultures, consisting almost wholly of a bacillus of the colon type, from which he made a vaccine and treated with remarkably good results a small number of cases. Gereda,⁴ of Madrid, in 1913 employed the vaccine treatment of McCarrison in ten cases, with fairly good results. The description of McCarrison's work impresses one with its highly scientific character. He was able to produce goitre in men by giving them in milk the filtrate of known goitrogenous waters. In the case of the control subjects, none of whom developed goitre, the water was first boiled. One of his experiments on animals consisted in the production of goitre in goats by causing them to drink water that had been infected from the fæces of goitrous men.

Furthermore, acting on the assumption that the intestinal

Rowley—Goitre in Relation to Insurance 109

tract might be the seat of infection, McCarrison⁵ treated over one hundred cases of goitre in men with intestinal antiseptics, notably thymol. His detailed record shows that in recent cases, under one year, the results were very satisfactory, not only upon the thyroid itself but upon the patient's general condition.

It is the belief of McCarrison, Bircher, Breitner, Lobenhoffer and other investigators, that seventy degrees centigrade causes water to lose its toxic properties, and that it must be some infective agent that causes goitre. Furthermore, the infective agent appears to be removed by the Berkefeld filter.

The researches of the Swiss Goitre Commission have proven that goitrogenous waters almost invariably show an infinitely higher bacterial content than innocuous waters.

Halstead,⁶ in a consideration of the relation of general and focal infections to thyroid enlargement, lays considerable emphasis upon infection being involved as a natural causative agent.

Billings⁷ urges a relationship between tonsillar focal infections and thyroid enlargement.

Beebe⁸ comments upon the relationship between pathological conditions of the nose and throat and hyperthyroidism, and reports that in his experience forty per cent. of hyperthyroid patients give a history of repeated attacks of acute tonsillitis.

The development of endemic goitre in relation to preceding or co-existent infectious conditions of the nose and throat was the basis of an interesting statistical study at the medical clinic of the University of Wisconsin.⁹

The study was based upon the examination of men and women entering the university covering the period of five years from 1910 to 1914, inclusive. In 1914 alone there were 1328 men examined; 362, or 27.3%, had thyroid involvement, and over 90% (90.3 %, to be exact) of these goitrous men were found to have some anatomical morbid changes, either in the tonsils or in the nasal passages, or in both. Pyorrhea, in this relation, was not specially observed.

These investigators made the discovery that endameba

gingivalis (Gros) was present in the tonsillar crypts in 33 of 34 subjects of chronic cryptic tonsillitis in association with goitre. Without referring in more detail to their work, I wish to quote the conclusions which they offer:

1. "Tonsillar lesions of an infective cryptic character were found in 22 $\frac{1}{2}$ %; and nasal, together with tonsillar lesions, existed in 90% of 362 goitrous individuals examined from this standpoint."

2. "In typically diseased tonsils out of 34 cases examined microscopically, 97% were found to harbor endameba gingivalis (Gros) in the tonsillar crypts."

3. "Of 16 individuals of this group who, after treatment by means of emetin hydrochloride, were re-examined, 13, or 81%, were shown to no longer have endamebæ in the cryptal contents."

4. "In 23 individuals to whom emetin was administered a reduction in the bulk of the goitre was appreciable in 18 individuals; and of seven disthyroid cases included in this group of treated cases, six were benefited in degrees varying from slight amelioration to apparent cure."

5. "Inability to demonstrate endamebæ in the thyroid gland renders improbable any direct casual relation of the amœbic infestation of the tonsils *per se* upon the development of thyroid disturbances."

6. "However, the improvement, morphologically and symptomatically, in the treated cases leaves little doubt, after ruling out a vasomotor influence from the emetin employed, as to an indirect relationship. A symbiosis of endamebæ with appropriate bacteria, leading to the elaboration and absorption into the thyroid of selective thyrotoxic poisons, is at least conceivable in explanation of such relation."

7. "In no sense do the writers care to be understood as advancing hereby an exclusive explanation for all goitres; other types and other locations of infections capable of producing thyrotoxic toxins, perhaps, too, toxic substances having a similar influence but derived from metabolic or alimentary fault, or even entering the body from without, are all of pos-

Rowley—Goitre in Relation to Insurance 111

sible influence; nor is the influence of sympathetic stimulation, however accomplished, to be overlooked. The writers are unable to follow, moreover, in any of these lines of thought into any satisfactory explanation of the known occurrence of belts of endemic goitre along certain well-defined glacier drifts."

Among the causes for relapse during convalescence after surgical treatment Crile¹⁰ has mentioned acute infections, such as tonsillitis and acute cold, tooth abscess, acute appendicitis, mastoiditis, diphtheria, etc. He further states that "intestinal auto-intoxication occurs in the more chronic type of Graves' disease, and strictly speaking is not a cause of relapse, but rather a continued exciting primary cause. Unless the auto-intoxication is recognized and controlled from the beginning only a partial relief may be expected."

The literature abounds with reports of investigations of various kinds that have been undertaken with the object of discovering some definite etiological factor in thyroid disease, but in this review I have thought it sufficient to make brief mention of only a few. While it would seem to be justifiable to conclude, from the predominating evidence to date, that the causative factor in at least some of the cases lies in some bacterial agent rather than in any chemical or mineral substance, I would urge that we do not lose sight altogether of the probable importance of other factors. In this connection I would again call attention to the experimental work of Bayon and also of Marine,¹¹ who concluded that the change in the thyroid was due to some biochemical action arising from metabolic disturbances, or at least closely associated with incorrect or incomplete diet. I would refer, also, to the studies of Cannon, Binger, and Fitz¹² on the sympathetic nervous system, and to the still more recent work of Wilson¹³ on the histopathology of the autonomic nervous system in goitre.

Whatever exciting factor may be responsible for the development of Graves' disease in any individual case, we are assured by Dr. Crile that the histological changes in the thyroid gland represent end-effects and are not primary causes in the development of the disease.

These histological changes are neither constant nor characteristic according to Crile.¹⁰ "A study of the cases at the Lakeside Clinic shows that the percentage of occurrence of hyperplasia varies from year to year. The presence of hyperplasia apparently depends upon the intensity of the disease, its duration, and the stage of the disease at which the operation was performed—whether before or at the height of the hyperplasia; whether after the hyperplastic stage has been succeeded by the colloid stage; or whether, on the other hand, the drive had been so intense that the thyroid cells themselves had been destroyed, so that the gland consisted almost entirely of fibrous tissue, in which case no hyperplasia existed." "It should be added that in our Clinic we do not recognize *thyrotoxicosis*, but classify all cases as Graves' disease."

Crile further states that among the total number of hyperplastic thyroids existent in the United States and Canada only a small percentage are incident to Graves' disease, and that in only from 50 to 75% of the cases of Graves' disease is the thyroid hyperplastic.

At the Mayo Clinic they recognize a hyperplastic and a non-hyperplastic type, and each of these is again divided into a toxic and a non-toxic variety, each type being characterized by a pretty definite symptom-complex.

This incomplete and rather fragmentary compilation of the results of recent scientific work regarding the etiology and pathogenesis of goitre does not, I am frank to confess, remove the nebulous state of uncertainty that has held this disease within its grasp for so long.

We are, however, confronted with a practical problem, and I wish I were able at this point to present in tabular form an experience based upon the after-history of several thousand cases that have been under treatment, showing the number that have died in the first year and in the second year and so on, and including the cause of death as well as other data that would be of interest.

The observations and inquiries that I have made have led to the conclusion that the private records of physicians and

Rowley—Goitre in Relation to Insurance 113

surgeons—and especially the records of general hospitals—show practically nothing in reference to this phase of the subject that can be said to be definite or exact. Nor do the records in their present form permit of any accurate tabulation.

When one attempts to formulate any idea as to the ultimate effect of goitre, he is forced, in the present state of knowledge, to rely to a great extent upon the opinions of those who have had the largest clinical experience with this disease.

Dr. Charles Mayo¹⁴ says, with reference to prognosis: "From a surgical standpoint operations, often aided by medical treatment, cure exophthalmic goitre in about 70% of the cases; that is, the patients feel well and are able to carry on the ordinary business affairs of life and forget that they have been sick." No statement appears as to the length of time such cases were under observation. He further says that: "Relapses occur in about 10% of cases of exophthalmic goitre," and that a "relapse of an appreciable degree occurs in about 10% of cases of degenerating simple goitre."

Dr. Bumstead¹⁵ reports that about 75% of cases of Graves' syndrome are cured by medical treatment.

It must be remembered, however, that a cure attributed to either medical or surgical treatment does not necessarily mean ultimate recovery from the disease in the sense in which we are forced to accept the meaning of the word "recovery." In this connection I call attention to the statement by Hector Mackenzie in the Bradshaw Lecture on Exophthalmic Goitre, delivered before the Royal College of Physicians of London on November 2, 1916: "There is reason to believe that in about 25% of the cases death results from the disease, and that under ordinary medical treatment in about 50% more or less complete recovery will eventually take place, while in the remainder the disease continues in a chronic form during life.

Dr. John Rogers,¹⁶ with a very large experience, has expressed the belief that goitre subjects are very poor lives for insurance, and while these cases die from some disease other than thyroid, he calls attention to the fact that diabetes in

these cases is peculiarly fatal and sometimes arises with great suddenness.

Again to quote Mayo,¹⁷ the source of so much valuable information: "Patients coming under observation with non-hyperplastic toxic goitre, gave a history of having first noted the goitre at the average age of twenty-two years, and the evidence of intoxication at the average of 36.5 years. The corresponding ages for hyperplastic goitre were, respectively, 32 and 32.9 years. That non-hyperplastic toxic goitre was noted ten years earlier in life than hyperplastic goitre; that 14.5 years elapsed between the appearances of non-hyperplastic goitre and the development of notable toxic symptoms; and that the constitutional symptoms were noted but a few months later than the goitre in the patients affected with hyperplastic thyroid, were alone sufficient to show that we were dealing with at least two distinct pathologic and clinical groups. . . . In the average course after the first year, the symptoms that may be attributed to long-continued intoxication rather than to a high degree of acute intoxication—that is, those from the more chronic types of heart, liver, and degeneration of the kidney enter into the clinical picture. In attempting to construct a composite curve, we find that the curves of those symptoms that we can readily attribute to a high degree of immediate intoxication from the thyroid gradually drop, while the curves for those findings attributable to a long-continued intoxication of a lower degree gradually rise."

Along the same line I offer a quotation from Plummer:¹⁸ "The majority of cases of colloid goitre have their inception between the fifteenth and eighteenth years; are prone to give clinical evidence of excessive function from the seventeenth to the twenty-first years; again enlarge with the high metabolism of pregnancy, and, with or without the clinical evidence of hyperthyroidism, give rise to a damaged heart between the thirty-fifth and fortieth years. After the fortieth year, 27% of the cases coming to the consultant have blood-pressure readings attributable to arterial hypertension. During the periods of increased functional activity the parenchyma may

Rowley—Goitre in Relation to Insurance 115

show demonstrable histologic evidence of cell hypertrophy. High degrees of hypertrophy are unusual.

"Adenomatous goitre follows much the same course. It is less apt to be accompanied by hyperthyroidism previous to the thirtieth year. After the thirtieth year it gives rise to much higher degrees of hyperthyroidism than does colloid goitre, and this without hypertrophy of the parenchymal cells. The incidence of exophthalmic goitre gradually rises to the thirtieth year and then falls to the sixtieth year. Colloid and adenomatous goitre predispose but slightly, if at all, to exophthalmic goitre, though the stimulus that gives rise to the hypertrophy of the latter will also stimulate the development of adenomas."

When we face the problem of deciding upon the insurability of goitre cases, which comprise a class that is increasing in numbers, we are forced to recognize the fact that as yet we have no reliable information to assist us. Until some valuable report of a statistical character can be completed it will be necessary, it seems to me, to weigh the evidence in each case from the standpoint of our knowledge of the nature of the disease and the likelihood of the continued presence of the primary excitant factor in its etiology. It will no doubt be of interest to many of you to know the result of a recent questionnaire addressed to the companies represented in this Association. This may be stated in general terms as follows:

The cases with toxic symptoms of any kind are not accepted by any of the companies. A few of the companies decline goitre cases of every type. A few of the companies apparently attach little or no importance to the small goitre stationary in size for several years and without symptoms. A majority of the companies regard the so-called "simple goitre" cases as impaired risks, and accept them with an extra rating or on some modified plan in specially selected cases.

In this connection it is of interest to note a statement attributed to Dr. Charles Mayo: "If the patients one year after operation for exophthalmic goitre can pass the ordinary examination, there being no dilatation of the heart or kidney

116 Twenty-Eighth Annual Meeting

symptoms, I believe that they can reasonably be accepted by the insurance companies. . . . In operation for simple goitre, if there were no degeneration or symptoms affecting the nervous system and heart, I would say that such patients could be accepted within a few months."

At this point I may perhaps be justified in stating very briefly my own attitude in regard to these cases.

1. The cases with a history of toxic symptoms not over one year in duration would appear to be standard risks after an interval of five years, with entire absence of symptoms, both local and general.
2. The cases with existent goitre, even though it be small and without toxic symptoms, cannot as a class be regarded as standard risks. Notwithstanding the frequency with which this condition is met in young women, I would caution against disregarding the likelihood of subsequent development of toxic symptoms.
3. Cases presenting toxic symptoms are obviously not insurable.

Let me say in conclusion that I am deeply conscious of the shortcomings of this paper, and I hope that, in the discussion to follow, some of the gaps will be bridged over and our ideas on this subject may become better crystallized.

REFERENCES

1. BAYON. *Lancet*, February 8, 1913.
2. FARRANT. *British Medical Journal*, Feb. 28 and July 18, 1914.
3. MCCARRISON. *Lancet*, January 18, 25, and Feb. 8, 1913.
4. SCHWIZZER. *Journal-Lancet*, April 15, 1917.
5. MCCARRISON. *Lancet*, February 8, 1913.
6. HALSTEAD. *American Journal Medical Science*, January, 1914.
7. BILLINGS. *Journal American Medical Association*, September 12, 1914.
8. BEEBE. *Journal American Medical Association*, August 29, 1914.
9. { EVANS,
MIDDLETON,
SMITH. } *American Journal Medical Science*, Feb., 1916.
10. CRILE. *Journal of the Medical Society of New Jersey*, May, 1917.

11. MARINE. *Journal Exper. Med.*, January, 1914.
12. { CANNON,
BINGER, } *American Journal Physiology*, March, 1915.
FITZ.
13. WILSON, L. B. *Journal of Lab. and Clin. Med.*, 1917. II.
14. MAYO, C. H. *Proceedings, Med. Sec., Amer. Life Convention*,
Mar., 1915.
15. BUMSTEAD. *Med. Record*, March 20, 1915.
16. ROGERS, JOHN. Personal Communication.
17. MAYO, C. H. *Surgery, Gynecology, and Obstetrics*, Sept., 1914.
18. PLUMMER, H. S. *Trans. Assoc. Amer. Phys.*, 1916.



SECOND DAY

Dr. Gage, President, in chair.

The meeting was called to order, after which balloting for the election of officers took place. Doctors Chapin and Colt were appointed tellers.

Dr. Gage—The first business of the morning is the discussion of Dr. Rowley's paper on goitre. I think the subject of goitre is one of increasing importance to us, because goitres are certainly being more frequently recognized. We know that some goitres are perfectly innocent, that they may last for years and never cause any particular disturbance, and are often called simple goitres. There are other kinds that look just the same in the early stages, that develop the exophthalmic type, and show evidences of hyper-thyroidism. It is a very difficult problem, and we do not know how to distinguish between them clinically in the early stages, and I do not see how we can distinguish them from an insurance point of view. This is one of the subjects on which we expect to get a great deal of light from the investigation which Mr. Hunter is making into the statistics

of the Mayo Foundation. Their experience with goitre has been enormous, and if we can get that experience into proper statistical form, which we seem likely to do, I believe it will be a very great help. Until we do that, I cannot see personally, nor have I ever been able to see, why the problem with regard to goitre is not very much like the problem with regard to albuminuria in young entrants. We know that simple albuminurias are of but little account, but we have not yet got to the point where we can distinguish between those that are not and those that are. It is the same with goitre. We know that many of these small goitres, especially the adenomatous type, where it is well encapsulated, some of the hypertrophies, and occasionally some of the cystic goitres, never cause any trouble, but we cannot state at any particular stage of that goitre whether it is going to produce hyper-thyroidism within the next year, or two or three, or whether it is not, and until we have some statistics in regard to the subject, it has seemed to me that most of the cases will have to be rejected as standard lives. It is possible, I think, that in some of the simple goitres that have been properly excised, where a definite and proper pathological and microscopical examination has been made, so that we are assured of its exact nature, and where not less than five years have elapsed without any apparent return, we may assume that they are safely insurable, but the unoperated case, that simply presents a small goitre, we will say in a person from twenty-five to thirty-five years of age, seems to me cannot be distinguished from the

case in which hyper-thyroidism will develop, and you will get the typical syndrome of the heart, the eyes, the tremor, and all the other symptoms that go with it; and of course when that develops, we know that case is not insurable as a standard risk.

It is a very interesting subject and a subject that is going to be more and more important, because goitre is certainly being recognized oftener and appearing oftener in our insurance work. I think Dr. Rowley has gone very thoroughly and very completely into the literature of the subject, and is to be congratulated on his paper.

Dr. Jaquith—Mr. President and Gentlemen: May I be permitted to read a part of my discussion of a paper on "Goitre" presented at a meeting of the American Life Convention in March, 1915? While the class is small, the figures may indicate the trend.

"Dr. W. Hale White, of Guy's Hospital, reported on forty-nine cases admitted to the hospital from 1888 to 1907, practically twenty years. He investigated these cases in 1910 and found there had been eight deaths. He had an actuary friend tell him what these eight deaths meant, and it was found that instead of eight deaths, there should have been five, showing that the mortality was about 160 per cent. It is noticeable that the majority of these deaths occurred under age forty-five, there being five deaths from 30 to 45, with an expected of three, or a mortality ratio of 160 per cent. Of a group of fifty-three private patients that this gentleman had, it was found that there were seven deaths with an expected of three, showing a mortality ratio of over 200 per cent. Between 30 and 45, there were three deaths with an expected of two, a mortality ratio of 150 per cent. His conclusions were that operation was undesirable, especially as a cure, as many cases show that the cure was not complete."

Dr. Rogers—We have reason to believe that there is a mortality of from 150 to 200%, in goitres unoperated on, in persons apparently well.

Dr. Van Wagenen—That is more to the point. It seems to me that the fallacy of such figures as Dr. Jaquith gives us is due to the fact that those are cases that have got to the point where it is necessary to go to the hospital, and are therefore ready for operation. It seems to me, too, that there is another fact that we may forget in calculating the mortality of these cases, that within only the last few years comparatively, operations for goitre have become common, and cases that never thought of operation ten or fifteen years ago now hope to be relieved by operation. Often those cases that do not immediately call for operation fall into the hands of some enthusiastic surgeon, and he operates on them, and they die.

Dr. Beckett—Mr. President, I think that as long as the mortality of goitre is as high as it is, we should handle these cases with a great deal of care. As Dr. Van Wagenen has just said, the operation itself is a serious operation. These cases at the younger ages may go on for a number of years, but after ten or fifteen years they will develop trouble, so that I think they are too serious a hazard to handle with anything other than a very rigid selection.

Dr. Rogers—I mentioned our experience because it corresponded so closely with Dr. Jaquith's figures. Our group is very small. These people will go along for a number of years, nobody can tell how long, without any symptoms, and then they blow up. Something has got to be done. They may be operated on and die, they may have medical treatment and die. Whatever it is, you get a mortality of somewhere in the neighborhood of these figures of Dr. Jaquith's.

Dr. Willard—I have no statistics to offer, but can give you some of the results of observation at our Home Office. We examine all applicants for positions at the Home Office as well as for positions in the field, and we are surprised to find the number of goitres (or, to be more correct, enlargement of the thyroid gland) occurring in young girls from 16 to 20 years.

This fact can be noted by any observer because of the change in style of dress in youngsters these days. Any group of young women, if carefully noted, will show a surprisingly large number of enlargements of the thyroid.

Among those of our employees who have this condition, we know that rather generally they have a larger number of bad days and call for larger amount of sick leave than the average of the force. They are not seriously ill, but they do have lots of breaks in their work.

Of course, we have more advanced cases in which the symptoms are grave, and exophthalmos and interference with the circulation are observed with all their attendant evils, but we have not been able in the beginning of one of these cases to determine whether it is going to remain quiescent or go on to a serious condition, and therefore we are quite uncomfortable and uncertain about accepting any applicants for insurance who present this condition.

Dr. Knight—I would be interested to know in the cases of these young girls who develop goitres just at that period of life, to what extent they disappear altogether.

Dr. Gage—There are no facts about that, but lots of impressions. I believe that in a great many of them there is a temporary hypertrophy of the thyroid during puberty, and at that period of life, and also during pregnancy, which is temporary and is not of any pathological significance, so far as we know.

Dr. Van Wagenen—Any Company that employs a number of young girls will, if they watch carefully, be surprised at the number of goitres. I have been very much surprised to note them among the young girls employed in our own office.

Dr. Gage—Dr. Rowley, will you say something in closing the discussion?

Dr. Rowley—I have practically nothing to add. I am sorry that I was unable to get statistical material to make my paper of more value from an insurance point of view. I think the paper has served at least one useful purpose, and that is, to introduce the subject for discussion by this Association.

122 Twenty-Eighth Annual Meeting

Along the line of the comments by Dr. Willard, I might say that I had the opportunity this past summer to discuss the goitre question with a physician in attendance at a large industrial plant where there are employed some three or four thousand girls. While there were no figures to show the prevalence of simple goitre among the girls, it was regarded as very common, and the physician in charge stated without reservation that those girls who had simple goitre were more frequently incapacitated and lost a lot more time from their work than those who did not have the goitre. Thank you, gentlemen, for the discussion.

The tellers announced the result of balloting for the election of officers, as follows:

PRESIDENT

DR. W. A. JAQUITH

FIRST VICE-PRESIDENT

DR. A. B. WRIGHT

SECOND VICE-PRESIDENT

DR. T. H. ROCKWELL

SECRETARY

DR. F. S. WEISSE

TREASURER

DR. A. S. KNIGHT

EDITOR OF THE PROCEEDINGS

DR. A. B. HOBBS

Beckett—Photoplay Industry Hazard 123

EXECUTIVE COUNCIL

DR. E. W. DWIGHT

DR. G. A. VAN WAGENEN

DR. J. ALLEN PATTON

Dr. Gage—Dr. Beckett has a paper which he would like to present before the Association.

Dr. Beckett—Mr. President and Gentlemen: We have in Los Angeles, and just outside the city limits, between twenty and thirty thousand people engaged in the moving picture business. I have recently made a very thorough investigation of these moving picture companies for our own benefit, and I have thought it probable that just a short paper on the subject might interest you as Medical Directors.

THE LIFE INSURANCE HAZARD IN THE PHOTO-PLAY INDUSTRY

The statements and opinions expressed in this paper are based upon personal investigation and discriminate inquiry. They refer exclusively to Southern California, where some forty companies employing twenty thousand persons, produce eighty per cent. of all the moving pictures released in America.

In my investigation the casuals, who are irregularly employed by the day, have been ignored. Although a considerable number of stock actors graduate from the ranks of the supernumeraries, the latter are in no sense representative of the photoplay stage.

Two misconceptions in relation to this business are strongly entrenched in the public mind and, if I mistake not, are entertained by a majority of medical directors. The first is that extraordinary physical risks are involved in acting for moving pictures; the second, that the men and women engaged in

the work fall short in their lives of the average standards of morality.

The actions depicted upon the screen naturally and designedly tend to convey the impression of dangerous performances. The efforts of the companies to create the illusion of risk are exceeded only by their precautions to avoid its actuality. With regard to the second point, it should be borne in mind that "screen stars" are public characters, in whose slightest doings the masses are inordinately interested. A scandal in connection with a prominent photoplayer is retained in the minds of millions with greater persistency than would be the death of a monarch. Furthermore, every man or girl who figures in the police records, whilst temporarily employed at three dollars a day by a film manufacturing company, is described in the newspapers as a moving picture actor or actress.

During the comparatively short period which has elapsed since the introduction of motion pictures great changes have taken place in the methods of production and in the personnel of those engaged in the business. In the early days the screen presented the effects of honest photographs. The audience witnessed actual performances to almost the same extent as they would upon the boards of the old-time theater. Real "stunts" were necessary in order to excite thrills. To-day, hair-raising acts and situations are pictured, in the production of which the element of danger is entirely absent. The line in the "Octoroon" that never failed to bring a Sadler's Wells pit off its feet—"Jacob McCloskey, the camera can't lie!"—is a stupendous joke in the light of latter-day developments. The most expert thimble-rigger who ever manipulated the nimble little pea was a tyro in the art of deception compared with the moving picture camera-man. There are practically no limits to photographic illusion. And, with the improvement of this branch of photoplay production, hazardous "stunts" have ceased to be a requirement of the business.

Nowadays most motion picture companies are backed by ample capital and conducted by experienced business men on precisely the same principles as those which govern manu-

Beckett—Photoplay Industry Hazard 125

facturing, banking and other commercial enterprises. As a consequence, the production of films is carried on in a new and healthy atmosphere. Players of a higher grade, whether measured by professional ability or personal character, have been attracted to the vocation. The demands of their work, their private inclinations and the interests of their employers combine to induce to decent lives.

The occupational hazard in the photoplay industry may conveniently be considered under the following classification:

1. Players in the general run of pictures.
2. Players in animal pictures.
3. Players in comedy pictures.
4. Well-paid employes, including directors, photographers, property men and a variety of others who do not act.

The numerous class which embraces laborers and persons occasionally hired by the day to appear in pictures need not be taken into account. Few of them ever apply for regular life insurance.

In connection with the occupational hazard we must consider the liability of the companies under the Workmen's Compensation Act, as well as their business interest in avoiding injuries to their employes. Mr. M. G. Jonas, the publicity manager of the Universal Film Co., which employs 1500 men and women on an average, stated that in two and a half years but one death had occurred among them during work and that was caused by an explosion. In the same period no more than five or six disabling accidents had happened to players. It is very doubtful whether any industrial concern, operating with an equal force, ever enjoyed so favorable an experience.

Mr. H. O. Davis, Manager of the Triangle Studio, where eight hundred persons are constantly engaged, declares that "the days of actual 'stunts' are over, the camera now obviating the necessity of dangerous performances." He explained that, "as accidents to motion picture actors involve greater loss than similar casualties do in any other line of business, the companies naturally take every possible precaution to prevent them. In fact, accidents have been practically eliminated from our experience. There has been but one injury to a member of the Triangle force in four months."

As an illustration of the costliness of mishaps in his business, Mr. Davis related an interesting incident. Recently, a collie dog, taking an important part in a recent production, was attacked by pneumonia whilst the film was in process of manufacture. The company engaged two veterinary surgeons and trained nurses to attend the animal, whose illness cost the company \$3,000.

William Desmond is a popular "stunt" actor. Like Douglas Fairbanks of the same class, he is an athlete. The former was asked for a frank statement of the degree of danger involved in his sensational performances. "There is positively none," he declared. "The camera does my stunts. Of course, athletic action is necessary to carry out the illusion. The Company wouldn't let me run the risk of turning an ankle, even if I were inclined to take a chance. There is a picture running in which I am shown jumping out of a window and hurtling from a third story window to the ground. That jump is photographed in four stages. The longest leap I made was about ten feet on to a mass of mattresses. Hardly any picture stunts are more risky than that one."

Perhaps the animal picture, more than any other, has influenced our adverse estimate of the photoplayer risk. As a matter of fact, there is no more danger involved in this class of performance than there is in the so-called "stunts." The photographic process termed "double exposure" obviates the necessity of actors coming in contact with the animals. The screen may depict a lion walking in upon a dinner party. In making such a film the human beings and the beast are never on the stage at the same time. On the rare occasions when it is necessary to take actor and animal with the same exposure, a male or female trainer doubles for the player.

At the famous David Horsley animal studio I enjoyed the fullest opportunity to inspect the mechanical contrivances and to learn the methods employed. My investigation compelled the conclusion that less danger attaches to the making of animal pictures than to exhibition of animals in a circus. The photographs are taken in secure enclosures which con-

nect by runways with the cages. It is hardly within the bounds of possibility for an animal to escape from control. The director and camera-man are protected by heavy bars. Even in the case of a "close-up" picture which, when seen on the screen must suggest the dangerous proximity of the photographer, he incurs no risk whatever, for his machine is operated from inside a wire cage that is wheeled up to within a foot or two of the animal.

In the making of "comics" of which the Keystone Film Company is the principal producer, there is not one whit more danger involved than in the other two classes of pictures. The bricks beneath a mass of which the actor is buried, are made of painted cloth, stretched upon the lightest wooden frame. The bottle smashed over the constable's head is formed of material so flimsy that you may rub it between your palms with impunity. The "plate glass" window, through which a player dives, is technically termed "candy," possibly because you may safely chew up a handful of it. The collapsing staircase entails less shock than one would incur by falling out of bed. As to the wild automobile, the most unsophisticated spectator knows that its erratic actions are pure illusion.

My investigation of the moral hazard was carried out through the most reliable channels of information. It led me to the conviction that the Life Insurance Companies have overestimated this phase of the risk not less than that of the physical hazard. It is beyond dispute that the conduct of moving picture people, during working hours conforms, in every respect, to an exceptionally high standard and I sincerely believe that their private lives are as free from vice as those of the general run of the community.

Photoplay acting is extremely hard and exacting work. Large salaries and heavy overhead expenses compel the companies to make every day and every hour count. Players are required to report—either at the studio or "on location,"—not later than eight o'clock and sometimes considerably earlier in the morning. It is the aim of the management to keep them constantly busy, except for a break at midday,

until five o'clock in the evening. Save for a shortened Saturday and a free Sunday, employes are subject to this routine for months at a stretch. The close of every work-day finds them as weary as any farm hand and glad to get to bed as soon as possible.

Late hours and excesses of any sort will leave their marks upon the countenance. These tell-tale revelations are accentuated by the camera. The photoplayer cannot afford to indulge in dissipation. Furthermore, the companies nowadays claim a right to exercise a reasonable control over their employes in leisure hours. Any serious irregularities in their lives that come to the knowledge of the management result in the reprimand and, if continued after warning, entail discharge. The most important employes are engaged under contracts which may be cancelled on account of immorality or dissipation.

All latter-day studios afford the fullest protection to girls employed by them. In the larger establishments a matron is retained for the express purpose of looking after the moral welfare and the health of the female employes. I may add that the relations between the matron and her charges are of the most intimate nature.

The rules and regulations maintained by studios in general are quite as strict and beneficial as those enforced by the most up-to-date industrial or mercantile establishments. It is not permitted to bring liquor into any "lot," not to take it upon "location." This prohibition applies equally to "stars" and "supernumeraries." The supervision is directed toward the maintenance of personal efficiency.

In conclusion, I will state that, in my opinion, the hazard involved in the insurance of moving picture players, regularly engaged, is not an extraordinary one. I believe that they, as well as the better paid employes in other branches of the business, may be safely accepted on the usual rates and plans. Individual cases must, of course, be treated on their merits, just as with other applicants, but there does not appear to be any reason for estimating the occupational or moral hazard

Beckett—Photoplay Industry Hazard 129

in the motion picture business any more adversely than the average of industrial risks.

STUDIO—The generic name for film manufacturing companies.

LOT—The premises on which a company's business is carried on.

LOCATION—Any place, outside of the lot, at which pictures are taken.

STILL—An ordinary photograph, without movement in the subject.

COMPANY—The aggregation of players engaged, under a director, in producing a film.

STOCK ACTORS—Those employed permanently or under contract for stipulated periods.

EXTRAS—Supernumeraries engaged temporarily on a daily wage.

DOUBLE EXPOSURE—Two pictures taken on the same film, a section of which is masked on each occasion.

CLOSE UP—A picture taken within three or four feet of the camera.

DOUBLING—Taking the place of an actor by a supernumerary. On the regular stage doubling signifies taking two parts by one actor.

COMICS—Low comedy plays of the slap-stick order.

Dr. Gage—The next business will be the beginning of the discussion on circulatory impairments, and we will first hear Dr. Mackenzie's paper.

130 Twenty-Eighth Annual Meeting

Dr. L. F. Mackenzie then read the following paper, entitled:

SOME CIRCULATORY IMPAIRMENTS FOUND IN
LIFE INSURANCE EXAMINATIONS

By L. F. MACKENZIE, M.D.

*Assistant Medical Director, The Prudential Insurance Company,
Newark, New Jersey*

Daily in the course of our review of medical reports we meet with impairments of the circulatory system, either central or peripheral, that call for very serious consideration if we are to do both Company and applicant justice. This paper deals with some of those involving the heart.

The subject is so vast that an attempt to discuss even one of them with anything approaching completeness would consume more time than is permissible. A few remarks then relative to those most frequently seen is all that will be undertaken. It is hoped they will provoke discussion and criticism leading to more scientific and equitable selection.

We cannot, for very good reasons, immediately put into practice each new advance in medicine, but are forced to a conservatism that savors at times of lack of progressiveness. New theories developed at the hands of investigators of note must be carefully weighed and considerable time elapse before sufficient experience is acquired to enable us to adopt them with safety.

The Medico-Actuarial Investigation has furnished some data as to the significance of rapid, irregular, and intermittent pulse, and in recent years something definite has been learned about abnormal arterial tension. The actual bearing of cardiac hypertrophy and murmurs is still obscure, companies having either declined these impairments outright or, having taken them and accumulated sufficient experience to warrant conclusions, have, as far as the writer is aware, exercised their

Mackenzie—Circulatory Impairments 131

prerogative and maintained silence. The Medico-Actuarial Mortality investigation is silent also concerning them. We are then left to a review of medical literature for statistical data, which is not satisfying, and to opinions of clinicians and laboratory workers of large experience. Unfortunately these gentlemen cannot follow a sufficient number of cases for a long enough time to justify unreserved acceptance of their conclusions. The literature reviewed shows such marked divergence of opinion that an unreadiness to be fully guided by even the most noted investigators is pardonable. We must then take action based on a review of the literature and our personal experiences and bias. The result is a very decided difference of opinion as to the advisability of accepting applicants presenting these defects.

The advances in this branch of medicine have been so marked in recent years and the changes in opinion as to the significance of some of these defects so great that they are almost, if not quite, revolutionary in character.

It is believed we are to-day in a vastly better position to estimate the probable effect of circulatory disease than we were fifteen or even ten years ago. Think for a moment of the knowledge acquired within a few years regarding the significance of the various arrhythmias and abnormal arterial tension, of the more accurate understanding of the physiology and pathology of the myocardium and its nervous mechanism, and it is believed the truth of the above statement will be admitted.

Almost equally important, from our point of view, is the fact that our examiners in the field are becoming better qualified and more capable of furnishing satisfactory data from which to draw conclusions. Further, our experience is that they are realizing more fully their responsibilities to both Company and applicant, and are more than ever willing and even anxious to give trustworthy information. This improvement is not by any means confined to the examiners in the larger centers, but is quite general. The success The Prudential has met with in its effort to improve the work of its ex-

aminers in making urinalyses and furnishing specimens to the Home Office has been so encouraging, and the willingness and interest to learn displayed by them so marked, we are encouraged to believe a similar effort to educate them in this branch of the work would result in gratifying improvement.

The defects to which we direct your attention at this time are rapidity, irregularities or intermissions of the pulse, heart murmurs, and abnormal arterial tension. Before discussing these it is desired to present some data which we think justifies us in bringing before this Association a subject which has been so frequently and so ably considered by it in the past.

A recent investigation of a large number of rejections showed that 29.07 per thousand cases examined were declined on account of circulatory impairments, and that of all the cases declined 24.7% showed one or more of these defects. In a series of 5195 rejections heart murmurs constituted the only impairment in 8.42%, and appeared in 18.02% of the cases. Rapid, irregular, or intermittent pulse alone or together were responsible for 2.32% and they appeared in 8.46%. Other circulatory defects were noted in but 1.15% and appeared in but 6.66%. Circulatory defects of various kinds constituted the only impairment in 11.8% and appeared alone or in combination with other impairments in 33.1%.

A little over two years ago an analysis made by the writer of 2104 rejections showed some interesting facts as to the frequency of appearance of some of these impairments and the time of life at which they were most often found. Of these cases 28.1% had circulatory abnormalities and of this number 484 or 81.5% were males. In 294 or 60.5% of these, circulatory impairments were the only ones recorded and 75.5% of these occurred between the ages 12 to 39. A different age distribution, which included all the cases (484) showed that 7.6% were in the age group 12 to 19 and 41.7% in the group 20 to 29, while 50.6% were in the group 30 and over.

As the total number of cases received in the age group 30 to 66 was larger than in the group 12 to 29, the percentage of circulatory disturbance was proportionately greater at the

Mackenzie—Circulatory Impairments 133

younger ages, the time of life when functional disturbance is most apt to occur.

The pulse was found to be over 90 in 116 or 24.4%. Of these 50% were under 30 years of age. Intermittent or irregular pulse was reported in 110 or 22.7%, of which number 56.3% were under 30, sixteen cases or 14.5% had intermissions, 37.5% were in the age groups 20 to 29, and 62.5% in the group 30 to 66. Irregularities appeared alone in 57 or 51.8%, 5 or 8.7% being found in the age group 12 to 19, 31 or 54.3% in the group 20 to 29 and 21 or 37% in the group 30-66 years. They occurred together in 37 cases of 33.6%. Heart murmurs were reported in 267 or 51.5% of the cases; of these, 25 or 9.3% were in the age group 12 to 19, 139 or 52% in the group 20 to 29, 103 or 38.5% in the group 30 to 66 years. The location of these murmurs was stated in 154 or 57.6%, unstated in 113 or 42.4%. The stated murmurs were classified as follows:

Mitral Regurgitation alone	94	61 %
Mitral Stenosis alone	11	7.1 %
Aortic Regurgitation	6	3.9 %
Aortic Stenosis	13	8.4 %
Double Murmurs, including involvement of two or more valves	11	7.1 %
Base Murmurs—valve not specified	16	10.3 %
Right Side Murmurs	3	1.9 %

Attention is called to the frequency with which intermissions or irregularities were found in the different age groups and the similarity it bears to that mentioned by recent writers on the subject. Attention is also directed to the frequency with which the different murmurs appeared.

The question as to whether an impairment is functional or organic is a pressing one, and the writer in his review of these 484 cases was impressed with the number of times defects previously found were subsequently reported absent.

11 times for rapid, irregular, or intermittent pulse
5 " " heart disease not specified
5 " " hypertrophy or dilatation
13 " " heart murmurs
8 " " hypertension
1 time " arteriosclerosis

134 Twenty-Eighth Annual Meeting

It is interesting to note that heart murmurs were subsequently not found more frequently than any of the others, the next in frequency being rapid, irregular, or intermittent heart. We thought in this connection it would be instructive to review some of the approved cases in which circulatory impairments had previously been reported. Two hundred and eight cases having 316 impairments not recorded at later examination were analyzed. Two or more impairments of the circulatory system evidently had been reported and subsequently not found in the same case in some instances.

The following tables show the duration of time elapsed since the impairment caused rejection and the case was later approved:

(A) BY DURATION OF TIME SINCE IMPAIRMENT WAS RECORDED.

	Pulse Rapid Irregular Inter- mittent	Heart Disease not Specified	Hyper- trophy or Dilata- tion	Heart Murmurs	Arterio- sclerosis	Hyper- tension	Total	%
Under 1 mo.	0	1	3	4	0	0	8	2.5
1-3 mos.	9	3	4	13	2	0	31	9.1
3-12 "	28	1	5	25	1	1	61	19.3
1-2 yrs.	14	2	2	21	2	0	41	12.9
3-5 "	31	0	8	30	0	4	73	23.1
6-9 "	31	4	7	32	4	1	79	25.0
10 yrs. over	9	1	1	12	0	0	23	7.2
	122	12	30	137	9	6	316	

(B) BY QUINQUENNIAL AGE PERIODS AT WHICH THESE IMPAIRMENTS WERE SUBSEQUENTLY NOT FOUND.

Ages 12-19	4	0	0	3	0	0	7	2.21
" 20-24	13	0	4	22	0	2	41	12.97
" 25-29	39	4	10	46	1	1	101	31.96
" 30-34	31	3	6	30	3	3	76	24.05
" 35-39	18	0	5	11	2	0	36	11.34
" 40-44	8	3	2	21	1	0	35	11.07
" 45-49	5	1	3	4	0	0	13	4.11
" 50-54	2	1	0	0	2	0	5	1.58
" 55-59	2	0	0	0	0	0	2	.63
" 60 and over	0	0	0	0	0	0	0	
	122	12	30	137	9	6	316	

Mackenzie—Circulatory Impairments 135

A study of these tables shows that of the impairments 31% were cleared up within one year from the date of rejection and 11.63% within the first three months, and we may say no case that had had one or more such impairments was approved until the examiner had his attention called to the previous history and a thorough examination requested with special reference to the defect previously found. They show further that 84.4% were found absent in applicants under forty and that 137 or 43.3% were heart murmurs, 122 or 38.6% rapid, irregular, or intermittent pulse.

These facts lead to one of two conclusions—either a functional condition existed in many cases which the former examiner failed to describe and the Company did not investigate; or an organic condition was present which our examiner, although the previous impairment had been called to his attention, failed to detect. We think it probable that the first is the more likely explanation.

The difficulties attending estimation of the true cardiac condition are very great at any time, particularly so in examining for life insurance where one or two examinations may have to suffice, but we think the figures given above, although small when contrasted with the total number of cases examined, are suggestive of the fact that functional impairments are not infrequent and should be diagnosed more often. We think the field examiner has not had this sufficiently brought to his attention but has concluded that a cardiac impairment meant rejection and too frequently he has not had his opinion corrected. Incomplete reports have therefore to some extent been countenanced and such indefinite answers as valvular heart disease, systolic murmur at base or apex, etc., have been often accepted in the Home Office without attempt being made to learn the actual condition present. We are satisfied that this does not apply to our Company alone. We are further satisfied that painstaking efforts to secure more accurate and complete reports would result in greater efficiency on the part of the field examiner and more just action in the Home Office.

It is fully realized that in our work we are at a very material

disadvantage for the reason that we have to be satisfied with usually but one examination and that not sufficiently searching to detect the more obscure forms of disease. The applicant's attitude, whether innocent or intentional, is to present the best side of his case to the examiner and conceal facts which if given would oftentimes result in detection of such impairments. Failure to get more details of personal history and present condition cannot, we think, be as frequently ascribed to the applicant's attitude as it has been, but is due, to a considerable extent, to failure of the examiner to properly interrogate and examine.

There are so many symptoms indicative of cardiac disease, the significance of which does not seem to be appreciated by the examiner, and questioning about which would throw light on a case without even giving the applicant a hint as to our reasons for such questioning, we feel it is quite possible to obtain much more satisfactory information with very little increased expenditure of time. That it is possible to arrive at a satisfactory understanding of every case, with more thorough questioning and reporting, is not maintained, but we are satisfied a safer and more just selection is possible, and that this can only be accomplished by impressing our examiners with the necessity of careful inquiry and of not being satisfied with insufficient statements. In our opinion a "snap diagnosis" is not necessary in insurance work, nor are the majority of applicants unwilling to spend a few minutes' additional time in order that an examiner may be in better position to estimate their true condition. The views that at times have been expressed regarding our ability to get more information seem to us far too pessimistic. In any large group of examiners all kinds will be present, but our experience is that a very large proportion of them are both capable of giving and willing to furnish us with sufficient data to admit of reasonably accurate estimation of any case. We say this advisedly, in view of recent experience with urinalyses and blood pressure. The manifestations of willingness to learn and desire to help seen by us lead to the conclusion that similar improvement will be

Mackenzie—Circulatory Impairments 137

shown in reports on circulatory conditions if we make a greater effort to bring it about.

RAPID PULSE. In Volume IV of the Medico-Actuarial Mortality Investigation, on pages 138 to 141, will be found tables for pulse rates of 90 to 100 and over 100. In class 31K, pulse rate 90 to 100, it is shown that for all ages and all insurance years, the mortality was 172% and in class 32K, A, B, and C, pulse rate over 100, the mortality for all ages and insurance years was 205% of the expected. In the first class mentioned it is stated that the death rate from heart disease, pneumonia, and especially tuberculosis of the lungs, was distinctly above the standard; in the second class, that the death rate from tuberculosis of the lungs was high, but did not account for the entire excess mortality. It appears to the writer that if these tables show anything it is that incomplete examinations have been made and the true condition of the applicants not obtained. Of the 332 deaths in the first class, 14.45% died in the first insurance year, 18.03% in the second, and 62.5% in the first five insurance years. In the second class, 18.36% died in the first, 22.4% in the second, and 65.3% in the first five insurance years.

Of the 484 rejected cases above referred to, 24.4% had a pulse rate over 90. Of these 50% were under thirty years of age, a time of life at which the rate is more apt to be accelerated in consequence of emotion, excitement, apprehension, etc.

Sir James MacKenzie claims that in some persons who have perfectly normal hearts the susceptibility to mental excitement is so great that it is impossible for a physician during examination to get a correct idea of the true pulse rate, but suggests that a history of how effort is undergone and the effect of deep slow breathing resulting in brief periods of slowing of the rate will assist in forming a just conclusion as to its significance. He further states that moderate exercise often occasions remarkable increase in rates in healthy hearts and is not necessarily an evidence of impairment.

It seems hardly possible that the Medico-Actuarial figures given represent the true significance of rapid heart at the time

of examination where no other impairment exists. We call your attention to the fact that deaths from heart disease, pneumonia, and tuberculosis were distinctly above the standard. As pneumonia is to a great extent a test of the condition of the heart, we think it probable that in these cases the heart was impaired at the time of examination and the two outstanding causes of death were heart disease and tuberculosis. With more careful investigation many of these cases might have been eliminated. The taking of risks with pulse rates over 90 or that such rates are of no serious import is not suggested. What we wish to emphasize is that this is simply a symptom that may or may not be indicative of disease, and that it is the duty of the medical examiner to determine the facts as nearly as possible and report them with reasons for forming any opinion he may give.

Pulse rates taken at the beginning of the interview or during the course of examination are apt to be accelerated, but if taken immediately after the declarations have been completed and before physical examination is commenced are much more likely to be normal. Careful examination of the heart, with regard to its rate and rhythm, quality of tones, size, presence or absence of murmurs, its action under varying conditions, such as sitting, standing, after exercise, and while in the recumbent position, and its correspondence in rate and rhythm with the pulse, should serve to determine whether or not a pathological condition is present.

IRREGULARITIES. Seven chief forms of irregularity are described by Lewis. Other forms exist, but are usually combinations of two or more of those to be mentioned. The chief forms are:

Sinus Arrhythmia (MacKenzie's youthful type).

Premature Contractions or Extra Systoles (MacKenzie's adult type).

Heart Block.

Auricular Fibrillation or Delirium Cordis.

Auricular Flutter.

Paroxysmal Tachycardia.

Pulsus Alternans.

Sinus arrhythmia and premature contractions, we think, are the only irregularities that admit of insurance with safety at standard rates or with but slight modification. As it is believed the others disqualify for insurance at such rates they will not be mentioned again, except in connection with differential diagnosis.

Before proceeding further, permit me to call your attention to a few fundamental physiological and pathological facts, which we think necessary to a just appreciation of the significance of sinus arrhythmia and so called extra systoles. The heart musculature is composed of two forms of tissue—the mature, which is purely muscular and responds to the impulses; the primitive, or neuromuscular, which originates or conveys these impulses. The sino-auricular node, or pacemaker, situated in the wall of the right auricle near the opening of the superior vena cava under normal conditions gives rise to the impulses exciting the heart to action. Nerve impulses proceeding from this node are distributed throughout the auricle and to the nodal tissue at the auriculo-ventricular junction, from which tissue they are carried to every part of the ventricle by the bundle of His or its branches.

Under certain abnormal conditions, either temporary or permanent, the tissues in the heart may become hypersensitive and give rise to impulse formation, which is more rapid than in the pacemaker. These impulses may arise in any part of the heart tissue, either auricular, ventricular or nodal, and for the time be formed more rapidly than, and replace, the impulses from the pacemaker. From these facts it seems that irregularities occur in at least three ways:

1. Alteration of impulse formation at the sino auricular node, due to altered vagal impulses.
2. Hypersensitiveness in some portion of the heart giving rise to impulses which replace those from the sino auricular node.
3. Some disturbance, either temporary or permanent, of the conducting system which so interferes with its function

as to block or delay the transmission of impulses, the severity and location of the disturbance determining the degree and effect of the block.

From the first of these it will be seen that the heart itself is not necessarily impaired in any way, but is simply responding to impulses that are changed either in rate or in rhythm. That this change is due entirely to extra cardiac conditions and is dependent to a large extent, if not entirely, on altered excitability of the vagal center.

In the second the trouble is in the heart muscle, but is due to hypersensitiveness, the result of nutritional changes which may be purely temporary in character and without pathological change in the structure.

The third is more likely to be due to permanent alteration in the tissue, but may be seen in acute affections when the heart muscle is involved, and which will entirely disappear with disappearance of the infection and restoration to normal.

It may then be said that heart block appearing in an applicant presenting himself for insurance, who seemed to be otherwise in good health, would be almost sure evidence of actual change in some portion of the cardiac tissue.

Sir James MacKenzie, in commenting on irregularities, makes the following statements: "Although so little has been said about irregularities by teachers and writers, the subject itself has by no means been ignored in practice. So ingrained had the belief become that a heart to be normal must be regular, that when an irregular heart was met with it was looked upon with suspicion; and many individuals, with perfectly sound hearts, have been rejected for life insurance and for appointments in military and civil life because of the presence of some innocuous irregularity, while tens of thousands have had their lives restricted and have been subjected to prolonged and useless treatment for a condition that called for no treatment. On the other hand, cases where the irregularity should have revealed the necessity for treatment were never properly understood and so were never properly dealt with.

"The great majority of irregular actions of the heart are of

Mackenzie—Circulatory Impairments 141

two kinds, one which occurs in youth, and the other which occurs in adult life.

"Proceeding on these lines, after I had collected over a thousand cases I sought for some definite basis of classification. With the assistance of the jugular pulse I was able to recognize different forms according to the mechanism of their production. Two large groups, which included, between them, about 90 per cent. of all the cases, emerged distinctly. These two groups differed. In one all the chambers of the heart participated in the irregularity, the contraction in each case being normal, while, in the other, the ventricle contracted prematurely while the auricle maintained its rhythm, or both auricle and ventricle contracted prematurely—the irregularity which is now called the ventricular and auricular extra systole.

"I was also able to separate the two groups by a second method, namely: the age incidence. I found that the former group occurred predominantly in the young ('The youthful type of irregularity') and that the latter group occurred predominantly in the later decades of life ('The adult type of irregularity')."

Should we accept such statements as quoted above, we will have to admit that the vast majority of applicants in whom irregularities occur are not suffering from organic changes in the myocardium. This is all the more likely, as doubtless MacKenzie's opinions are based on experience with persons who either believed themselves to have or were actually suffering from disease, while applicants for insurance usually consider themselves in excellent health.

SINUS ARHYTHMIA. MacKenzie goes so far as to claim that this form of arrhythmia is an indication that the heart is not damaged and is an evidence that all exciting causes have gone, and therefore we can be justified in assuming that the heart has escaped damage and further that he looks upon the presence of this irregularity as an evidence that the heart has escaped infection when the rate is found below 70 per minute. Where the heart has been affected it is possible that the appearance of this irregularity may show that the active stage of infection

has ceased. It calls for no special treatment, as its presence indicates that the heart is healthy.

Lewis claims "the commoner forms of sinus irregularity are of little prognostic value and are to be regarded as slight exaggeration of a normal phenomenon (respiratory irregularity, or as evidences of a mild or insignificant instability of tonic inhibitory nerve action. Their import lies chiefly in possible confusion with other forms of heart irregularity. They should not be allowed to influence the habits of those who exhibit them. Neither do these suggest or require any special therapeutic measure."

This irregularity then being of so little significance in an otherwise healthy subject, the importance of its recognition by the examiners is very evident, and we are satisfied they should have no difficulty in differentiating it. If it is respiratory in type, the change in rate with the rise and fall in respiration will be easily detected. If not easily manifest by these means it may become established as the breathing is deepened. There is no irregularity in the force of the pulse, the waves being equal in volume, and the irregularity disappears as the pulse rate is accelerated. It is almost confined to rates below 100 per minute, is more noticeable as the pulse rate decreases in frequency, and usually disappears after exercise.

EXTRA SYSTOLES. Greater difficulty is met with in arriving at a satisfactory estimate as to the significance of this form of irregularity, and it therefore calls for rather more attention than the one just considered. MacKenzie states: "Seeing that healthy men and women may present this form of irregularity, it can be accepted that extra systoles, in themselves, are not indications of disease or of impairment of the heart's efficiency. When there are signs of heart failure the prognosis should be based upon the other symptoms present and not on the presence of extra systole.

"It may therefore be stated that, when the extra systole is the only abnormal sign, the prognosis is good, and when it is associated with other signs the prognosis should be based on these other signs."

Hirschfelder claims that "the presence of occasional extra systoles in an otherwise healthy person, whose blood pressure is normal and who does not become especially short of breath upon exercise, may be entirely disregarded. As has been stated, they are particularly common where the pulse rate is quickened by atropin, nitro-glycerine, or even by exercise."

Dr. Martin, in a paper read before this Association at its twenty-second annual meeting, says that one-half of all the irregularities are due to extra systoles and mentions the fact that three classes of cases are unsatisfactory in which they occur.

1. Those with previous cardiac disease.
2. Those with advanced arterial sclerosis.
3. Those with hypertension.

Where no lesion is present otherwise, he claims the prognosis depends on the age, being good in those who are young and healthy, but thinks that after 50 years extra systoles are often the first cry of distress. In a large proportion of the cases he believes they arise from nervousness.

Wiggers says: "It is probable that premature contractions may often arise from perfectly normal hearts. More frequently, however, they arise in hearts that are abnormally irritable. It may be assumed in these cases that irritability of the heart is increased through toxins, internal secretion, caffeine, nicotine, etc., so that it reacts to the tiny normal ineffective stimuli that bombard it or that pathological disturbances of structure are actually present. When they occur in an advancing age, after infections, or in association with hypertrophy and valvular lesions, we should incline to the latter diagnosis. The prognostic import of premature systoles seems to depend largely whether they are the only sign of irregular action or whether they are accompanied by other evidences of disturbed function. In the former case they are probably of little concern. In the latter case they indicate disturbances in the structure and function of the myocardium. Their chief clinical value is that they attract attention to the

cardiac condition which leads to a search for the presence or absence of other symptoms of cardiac impairment."

Lewis, in discussing the prognosis, claims: "When frequent and persistent they often accompany grave affections of the heart. It must be admitted that all such beats are decided evidence of a pathological condition, and that a pathological process has its seat in the tissues of the heart," but further says: "They may be present for frequent and prolonged periods, and that those who manifest them may do so from an early to a good old age, such patients never showing any other sign or symptoms of cardiac disability. It may be said, therefore, that in themselves premature beats cannot be regarded as evidences of serious involvement of the heart muscle. Premature contractions, when present and frequent, must inevitably increase the work of the heart, but the amount of the added burden is not easy to ascertain. It is probably not weighty. Premature contractions constitute and bear witness to defects; there is the mechanical imperfection, and there is the evidence of altered cardiac nutrition and the more frequent the interruptions, the greater the degree of such defects. Premature beats, true paroxysmal tachycardia, auricular flutter and fibrillation have a common pathological basis; they are one and all the outcome of new impulse formation in the heart."

An effort was made in selecting the above quotations to present the best and the worst, with regard to this defect, and we think that for our purposes an applicant under fifty years of age, without history of previous cardiac involvement, with an otherwise normally functioning heart, normal arteries, normal blood pressure, satisfactory physical condition and good family history, should not be barred from insurance at standard rates simply because extra systoles happen to be present with moderate frequency.

Extra systoles appearing in applicants of 50 years of age and over present a far more serious aspect, but we believe where other evidences of disease are absent such cases are insurable with slight modifications. With evidence of other impair-

ments of the circulatory system they, in our opinion, constitute a bar to insurance.

We have found that our examiners have improved in the recognition of this departure from the normal, but believe its significance and means of differentiation from other irregularities cannot be too carefully impressed upon them. The diagnosis presents no special difficulties, even with the means possessed by the average physician. The prominent points of diagnosis may be mentioned, as follows: The beats missed at the pulse are heard at the heart, and occur in threes or fours, with a prolonged pause following, the number of beats heard being determined by the force of the extra systole. If not sufficiently strong to open the aortic valves but three beats will be heard; otherwise four beats will be noticed. The pulsation between the extra systoles are regular in both rate and rhythm. The premature contractions very rarely accompany rates of 120 and over. While they may not entirely disappear after exercise, we have very frequently found that they do, and one especially interesting case came before us for examination a short time ago in which the applicant admitted that he had known of the extra systoles since the age of thirteen. They appeared with unusual frequency and seemed to be in all possible forms, from a single extra systole to a bigeminal or trigeminal pulse. They completely disappeared when the pulse reached the rate of 90 or over. Extra systoles usually increase in frequency as the pulse rate becomes slower.

Before leaving this part of the subject we wish to call your attention to the frequency with which irregularities and intermissions appeared in the 484 cases analyzed and above reviewed. Of these, 110 or 22.7% showed intermissions or irregularity. Of the 110, 56.3% were under 30 and 72.7% under 40 years of age. Unfortunately in these percentages are included cases showing other impairments, circulatory or otherwise, but as the percentages are so large and many of the other impairments would not in any way affect the heart action, we think that the influence of defects that would alter impulse formation in the heart have not, to a great extent,

increased this defect. Of these cases 36.3% had circulatory disturbance only.

Vol. IV., classes 29 and 30, of the Medico-Actuarial Mortality Investigation, gives some data as to the effect of intermissions and irregularity. The interesting feature of these tables is that the percentage ratio was highest after 60 years of age, being 153% for irregularities, and 178% for intermissions, but the number of cases is too small to admit the drawing of safe conclusions. The irregularities showed a ratio of actual to expected deaths for all ages and insurance years of but 95, while intermittent pulse for all ages and years was but 113. Many of the cases in class 30 (Intermittent Pulse), and probably nearly all of them, had extra systoles. If any cases of true heart block crept in then the mortality for extra systoles is even more favorable than is shown by investigation. It does not seem possible that other forms of irregularity would have been accepted in sufficient number to have materially altered the ratio between actual and expected deaths. The character of the irregularity would have been so marked or the pulse rate so great in other conditions as to have excluded them.

We have to admit that it is doubtful if the time will come that we will be able to exclude all cases of tachycardia, auricular flutter or even auricular fibrillation, as they may be absent for long periods, but as the two former are comparatively rare their influence in our work must be of very minor importance. With auricular fibrillation other evidence of disease is usually present and the periods of its absence are apt to be less frequent and shorter.

All things considered, we believe that the recent knowledge acquired has, if applied, placed us in a position to estimate very accurately the value of any risk presenting irregular pulse and that the correctness of our estimate will be determined by the efficiency of our examiners. This efficiency is dependent on the grade of men selected for our work and the care and thoroughness with which we train them. We are satisfied that fully 90% of our examiners do require training if we are to get the best results.

HEART MURMURS. Whatever we in the Home Office may think of cardiac murmurs, these murmurs are too often interpreted and reported by the average examiner as organic. When reported they are one of the most difficult problems with which we have to deal. The first question that arises is: "Is the murmur functional or organic?" the second: "What effect is it likely to have on the applicant's longevity?"

We will first discuss functional murmurs.

MacKenzie states: "About a hundred years ago auscultation began to be systematically employed in the examination of the heart. With that injudicious enthusiasm, which at all times has heralded a new method of observation, fabulous qualities were at first attributed to the stethoscope. People were found to have murmurs before their death; hence, at a time before the cause of the murmurs was known, and long before any single observer had watched individual cases long enough to understand the significance of the murmurs, the statement went forth with all the weight of the highest authorities that these signs betokened grievous heart trouble. The whole profession suffers from this untrustworthy observation. Perfectly healthy men are, to-day, being rejected for the Army, or invalided out of it, because a murmur has been detected in their hearts. Others, who present themselves for life insurance, are rejected or made to pay a higher premium for the same reason. At times, physicians of experience will admit that certain murmurs may not have a serious significance; in saying this many of them appear to imagine that they have made an important contribution to the subject. It must be more than twenty-five years since Graham Steel startled me out of a deeply-cherished belief by stating that "no one ever dies from mitral regurgitation."—I carefully observed my patients to see whether or not it was true; and now I can fully endorse Graham Steel's dictum. Murmurs may be present in hearts which are perfectly healthy in every respect. The conclusion that these hearts are healthy is arrived at because the efficiency of the heart is unimpaired, the individuals lead strenuous lives and never show any sign of heart-failure, while, if by accident

or other cause they died, no disease or damage can be detected in the heart on post-mortem examination. The assumption, then, that the sounds of a healthy heart must be clearly struck and free from murmurs is not based on accurate observation. Consideration of the functional efficiency of the heart offers, undoubtedly, the best guide in these cases, and we may fairly assume that when the heart is normal in size and its efficiency is not impaired the murmur is physiological."

In another work by the same author, he states: "Murmurs may appear in hearts with no damage to the valves. Individuals with functional murmurs may be in perfect health and lead strenuous lives and never show the slightest sign of heart failure. From this we can conclude that murmurs may be physiological and normal even and indicate neither impairment of the heart's efficiency nor foreshadow the oncoming of heart failure.

Hirschfelder says: "Murmurs of the heart without the presence of valvular lesions are so common that autopsy evidence led Laennec to the erroneous belief that murmurs were of no diagnostic importance whatever," and refers to the fact that "Potain, who has made the most extensive investigations upon the subject, found such murmurs in one-eighth of all the patients seen in his hospital service."

Cabot says: "Not every murmur which is to be heard over the heart points to disease either in the valves or in the orifices of the heart. Perhaps the majority of all murmurs are thus unassociated with valvular disease."

Greene discussing this subject states: "No correct conclusion can be drawn from the examination of an over rapid, tumultuously beating heart. Under such conditions errors occur in two directions: First, existing organic murmurs are obscured and, second, still more frequently, organic murmurs are reported where nothing more than a temporary dynamic or accidental murmur or harsh heart sound exists. Functional or accidental murmurs are extremely common in character and are occasionally very puzzling, but rest, reassurance and,

if necessary, re-examination, are usually sufficient to make clear the actual condition."

Martin, in his paper read before this Association, said: "It is customary to speak of murmurs not due to organic disease as functional murmurs and one of the common sources of error in life insurance examinations arises, I think, from a faulty appreciation of the frequency of these functional sounds at any orifice, and with any period of the cardiac cycle. The fact that many functional murmurs occur with systole at the mitral area, or all over the præcordium at any orifice, that some too are diastolic and yet transitory; that with anæmia they may be heard at the pulmonary, or mitral, or tricuspid areas, and very often give rise to temporary tricuspid regurgitation, without ever inducing heart failure."

While it is possible and even probable that a very large proportion of all murmurs are functional, it is doubtful if the proportion would be as great in those presenting themselves for life insurance examination. We have discussed this subject with several of the Company's examiners of ability and long experience. Two of them felt that approximately 25% of all murmurs heard by them during their examinations were functional. One was more conservative, believing that at the outside but 15% were functional. If $\frac{1}{5}$ to $\frac{1}{4}$ of the reported murmurs are not organic, there is surely marked room for improvement, for it is the exception rather than the rule for an examiner to make differentiation between them.

Our analysis of 208 cases, in which 316 impairments had been found and were subsequently reported absent, further supports this view, for in them valvular heart disease had been reported and subsequently not found in 43.3%.

For companies doing only a standard business the question under consideration is quite as important as for those doing a substandard business. Whether a murmur is functional or organic is often difficult to decide, but can, we believe, be determined by a majority of our examiners if the following points are carefully investigated and reported on by them:

The exact location of the apex beat, whether localized, dif-

fuse or heaving, area of cardiac dulness, whether normal or enlarged, point of maximum intensity of the murmur, its area of distribution, direction of transmission, time of appearance in the cardiac cycle, relation to breath sounds and changes in posture, changes in the intensity of the sounds, particularly the second sounds, condition of the arteries, presence or absence of anæmia, blood pressure, both systolic and diastolic, and urinalysis. This may seem a great deal to expect, but no satisfactory diagnosis can be made until each point has been determined. The personal history is, of course, exceedingly important, particularly with regard to syphilis, rheumatism, chorea, and tonsillitis.

On the left side of the heart the two murmurs which are most frequently confusing are aortic stenosis and mitral regurgitation. In aortic stenosis, age is most important. Barring syphilitic infection, a systolic murmur at this point is very likely to be functional and is almost certainly so if there is no thrill, no hypertrophy, normal aortic second sound, no evidence of arteriosclerosis and the pulse regular and of good volume. Furthermore, an organic murmur at this valve is usually complicated by aortic or mitral regurgitation.

Functional murmurs are most common, however, in the pulmonary area, but are frequently heard at the apex. They are usually soft and blowing in character, heard over a limited area, usually not transmitted, frequently louder at the end of inspiration and the pulmonary second sound is not accentuated. They are more influenced by position than organic murmurs and there is no enlargement of the heart or other evidence of cardiovascular disease.

Dr. Root has called attention to an extra cardiac murmur which he has at times found confusing and which he thinks due to pressure from below upwards as from distended stomach. He has found it present shortly after a meal, but absent a few hours later.

Cabot says that organic murmurs occupy any part of the cardiac cycle, if systolic are usually transmitted and are associated with evidence of enlargement of the heart and change in

the second sound, are not infrequently musical or rasping and relatively uninfluenced by exertion, position and exercise, whereas functional murmurs are almost always soft and blowing, never musical, usually heard in the pulmonary area, not usually transmitted beyond the precordial area, usually loudest at end of inspiration, the second sounds are not accentuated and there is no evidence of enlargement. Speaking of cardio-respiratory murmurs he states: They may be either systolic or diastolic, but the majority are systolic, are greatly affected by change in position and by breathing; increased during inspiration and absent at the end of expiration. They may be modified by pressure of the stethoscope on the thorax, whereas organic murmurs are uninfluenced by pressure.

Turning now to organic murmurs,—Norris says that the French have an axiom "A disease of the valves is not a disease of the heart," and quotes Sir Andrew Clark to the effect that in the study of 700 cases he found there was often practically no shortening of life and MacKenzie wonders "whether the use of auscultation has not been the means of doing more harm than good."

Martin says: "To regard the mere existence of say a mitral murmur, even with a previous rheumatic history, as per se, a grave omen or a cause of rejection for life insurance, seems to blind oneself to the more accurate knowledge acquired from recent investigations."

Osler in discussing prognosis in valvular disease claims that "Practitioners who are not adepts in auscultation and feel unable to estimate the value of the various heart murmurs should remember that the best judgment of the condition may be gathered from inspection and palpation. With an apex beat in the normal situation and regular in rhythm the auscultatory phenomena may be practically disregarded." He quotes Sir Andrew Clark as saying that "A murmur per se is of little or no moment in determining the prognosis in a given case."

While a murmur is a symptom of importance, its significance depends almost wholly on other evidence of disease.

This evidence is to be obtained, first, by inspection, palpation and percussion and, second, by careful observation and questioning, in order to elicit objective or subjective symptoms which though perhaps in themselves of little moment, when considered in connection with the murmur establish its true significance.

The intensity of a murmur seems to influence the judgment of a great many examiners and a loud murmur apparently creates a greater impression than a faint one. In reality a loud murmur usually suggests a competent heart muscle and may be due to very trifling involvement of the valve whereas a most serious condition may exist and a murmur be faint or absent.

Age of the applicant is an important consideration and Osler claims that "The older the individual at the time of the endocarditis the better is the prospect. The arteriosclerotic variety may not diminish the expectation of life"; this in connection with mitral regurgitation. We think the same would not apply equally to aortic stenosis.

The efficiency with which the circulation is maintained depends not so much on the competency of the valves as on the condition of the heart muscle. Increased muscular exercise, either from labor or athletics, mental worry and injudicious habits mean an increased strain thrown upon the heart. For this reason occupation, amusements, environment, habits and social condition are very important considerations, influencing, as they do, the heart muscle favorably or unfavorably and must all be considered in forming an estimate of life expectancy.

Usually a valvular lesion of several years' standing is not progressive and the condition of the heart muscle and its ability to respond to exercise are the vital factors in judging a case.

The acceptance of risks showing murmurs other than those of a functional character must be considered even in the most favorable cases as somewhat hazardous, the degree of hazard, of course, depending upon the extent of impairment of the heart muscle.

BLOOD PRESSURE. We were asked by Dr. Gage to say

Mackenzie—Circulatory Impairments 153

something further in regard to our experience with blood pressure, but have little to add to what we have said in the past, as it is our belief that the normal blood pressure, both systolic and diastolic, has been pretty well determined for the different ages.

Since Dr. Fisher's figures showing the mortality for hypertension were first presented to this Association, auscultatory reading of the blood pressure has become almost universal with our examiners. His figures were, we think, based to a large extent on readings taken by palpation and believe, with safety, 5 *mm.* may be added to his first records, as the systolic pressure is at least 5 *mm.* and is claimed by many authorities to be 8 to 10 *mm.* higher by auscultation than palpation. Our combined records do not show much increase for the average readings over those reported by the doctor. The more recent readings we analyzed did show a slight increase, but even these were impaired with palpatory readings. We shall have to interpret the mortality given by him in this light and shall probably be justified in accepting applicants with somewhat higher blood pressures than would have been the case a few years ago.

In Table V of Dr. Fisher's report presented to this Association at the twenty-fourth annual meeting, the mortality for four years was 111.77% of the expected. Auscultatory readings were used so little at that time that they may be disregarded in consideration of this table. The average systolic pressure for all the cases, which were 525 in number, was 152.58 *mm.* Might we not be justified in thinking an average of 157 or 158 *mm.* resulting from readings taken at this time, would show a similar mortality?

Sir James MacKenzie says: "I never take the blood pressure alone as a guide to an opinion, but consider also the state of the arteries, the size and efficiency of the heart and the state of the kidneys. With the data thus obtained I venture upon an opinion, but even then it is by no means a very certain one."

We are not advocating the taking of cases with decided hypertension, but we do wish to be understood as thinking that it is unwise to be guided too rigidly by limits given as normal.

We are not forgetful of the many instances that have been presented to this Association where high blood pressure readings were the only abnormal condition found, or of Dr. Fisher's valuable mortality tables, where early death resulted. In spite of these we cannot escape the conclusion that too much importance has been attributed to this indication of disease. We believe blood pressure is a great help in the selection of risks, but not necessarily a death warrant when 5 mm. above our present maximum normal limits, and think that many cases of moderate hypertension, after careful exclusion of every other evidence of disease, might be taken with slight modification.

Since the last meeting of this Association we have ceased keeping records of our blood pressure cases. In place of this we are watching our claim records very closely and hope at some time in the future to have an opportunity of presenting an analysis of those cases in which records were taken and which have become claims.

We have also made an effort to educate our examiners with regard to the diastolic pressure. Whenever the pulse pressure recorded was under 25 mm. we have called this fact to the attention of the examiner and sent him a circular letter which is here reproduced:

DEAR DOCTOR:

In your report of _____, on the above named person, you recorded the systolic pressure as _____ mm., and the diastolic as _____ mm. The difference between these gives a pulse pressure of but _____ mm.

The average normal pulse pressure, as shown by the best statistics available, is 40 mm., with minimum and maximum limits of 25 and 60 mm. A pulse pressure under 25 mm. is suggestive of impaired cardiac tone.

The pressures recorded in this case lead us to think you are reading the diastolic pressure at too high a point on the scale and as a result the pulse pressure is too small.

We enclose a copy of our letter on blood pressure and will thank you to read it very carefully. Please pay particular attention to paragraph 5. We are particularly anxious to have the diastolic pressure recorded at the point of disappearance

Mackenzie—Circulatory Impairments 155

of all sound, as it is sufficiently accurate for all practical purposes and makes our readings more uniform.

Should you be in doubt concerning the technique of the procedure or the significance of the readings, it will be a pleasure to correspond with you concerning them.

Will you be good enough to acknowledge receipt of this letter on the reverse side?

I remain,

Very truly yours,

FF-DA

ASSISTANT MEDICAL DIRECTOR.

Our results have been exceedingly satisfactory. Few of the examiners have had to be written to a second time and nearly all of them expressed their thanks for the information conveyed and assured us that the readings would receive more careful attention in the future.

We have probably attempted in this paper to cover too much ground and are keenly aware of its imperfections. An attempt has been made to bring to your attention some of the difficulties with which we come in contact and to suggest a way in which to overcome them. That we shall ever reach the time when our examiners will have attained such a state of perfection as to enable us to put implicit confidence in the reports of all of them cannot be hoped, but we have every right to think great improvement will follow correspondence with them on individual cases and pamphlets sent them from time to time from the Home Office, dealing with these impairments.

AUTHORS CONSULTED OR FROM WHOM QUOTATIONS HAVE BEEN MADE.

CABOT, R. C. "Physical Diagnosis." 4th Edition.

GREENE, C. L. "Examinations for Life Insurance." 2nd Edition.

HIRSCHFELDER, A. D. "Diseases of the Heart and Aorta." 3rd Edition.

LEWIS, THOMAS. "Clinical Disorders of the Heart Beat." 3rd Edition.

MACKENZIE, Sir JAMES. "Diseases of the Heart." 3rd Edition.

MACKENZIE, Sir JAMES. "Principles of Diagnosis and Treatment in Heart Affections." 1916.

NORRIS, G. W. "Studies in Cardiac Pathology."

OSLER, Sir WM. "Practice of Medicine." 1902.

156 Twenty-Eighth Annual Meeting

Root, E. K. "The Differential Diagnosis of Cardio Vesicular Murmurs." Tenth Annual Meeting Med. Dir. Ass'n.

WIGGERS, C. J. "Circulation in Health and Disease." 1915.

Dr. Gage—Before discussing Dr. Mackenzie's paper, I think we will hear the report of the Committee on Blood Pressure which will be presented by Dr. Fisher.

Dr. Fisher read the following report of the Committee on Blood Pressure.

REPORT OF THE COMMITTEE ON BLOOD PRESSURE

BY DR. J. W. FISHER,

Medical Director, Northwestern Mutual Life Insurance Company

By referring to Table I in my report of October 7, 1915, to this Association, entitled, "The Diagnostic Value of the Systolic Blood Pressure," a record will be found of 2,635 accepted risks, ages 40-60, insured in the Northwestern Mutual Life during the years August, 1907-1910, inclusive, with a systolic blood pressure ranging from 140 to 149 mm. hg., with an average pressure of 142.42 mm. Hg. In this report, Table I is divided into two classes, 1788 where the blood pressure ranged from 140 to 144 mm. Hg., with an average pressure of 140.66 mm. Hg., and the remainder, 847 cases, where the blood pressure ranged from 145 to 149 mm. Hg., with an average pressure of 146.35 mm. Hg. The mortality was computed to August 1, 1917, by the M. A. Table. In the first class, the mortality was 87.70%; in the second class, the mortality was 105.13% of the table.

In the same report, Table II shows the Company's mortality experience on 521 accepted risks, with a blood pressure of 150-160 mm. Hg., and an average pressure of 152.58 mm. Hg. This mortality was computed to August 1, 1917, showing a

Fisher—Committee on Blood Pressure 157

percentage of 126.24 of the Table. It should be born in mind that the mortality of the Northwestern Mutual is 79% of the M. A. Table.

From August, 1907 to 1910 inclusive, 306 risks were rejected, solely on account of high systolic blood pressure (average blood pressure 170 mm.).

One thousand eight hundred and eighty risks were rejected from August, 1907 to August 1, 1917; rejection based solely on high systolic blood pressure, with the results shown in the table herewith.

TABLE NO. I.

THE NORTHWESTERN MUTUAL LIFE INSURANCE COMPANY.

Summary of Mortality Experience with respect to Systolic Blood Pressure

Accepted and Rejected Risks—Ages 40-60

Actual Mortality to August 1, 1917, as compared with Expected (M. A. Table).

Average Systolic Blood Pressure mm. Hg.	Period	No. Risks		Expected	Actual	%
		Approved	Rejected			
140.66 mm. Hg.	August 1907 to 1910 incl.	1788		163.060	143	87.70
146.35 " "	"	847		77.050	81	105.13
152.58 " "	"	521		56.243	71	126.24
160.00 " "	August 1907 to Aug. 1917		1880	92.571	155	167.44
170.00 " "	August 1907 to 1910 incl.		303	34.977	74	211.57

158 Twenty-Eighth Annual Meeting

TABLE NO. II.

*Mortality Experience—August, 1907 to August 1, 1917
As compared with Expected (M. A. Table)
Risks Rejected—High Blood Pressure Only.*

Mm. Hg. over average pressure for age	Number	Expected	Actual	%
* 10-14 mm. Hg.	121	5.544	7	126.26
15-24 " "	630	26.086	34	130.34
25-34 " "	499	24.034	33	137.31
35-49 " "	374	22.972	46	200.24
50 mm. Hg. and over	256	13.935	35	251.17
TOTAL	1880	92.571	155	167.44

* It will be seen that in 121 out of the 1880 cases rejected, as above, the blood pressure averaged twelve millimeters above the average for the age. In many of these cases, the first reading was high. In all of these cases, additional blood pressure readings were called for, and a sample of urine was requested sent to the home office. In others, several readings were taken with an average of about 12 millimeters in excess of the average for the age. Seventy of these cases showed a subsequent impairment. Samples of urine were examined at the home office in eighty cases, and either albumin or casts, or both, were found in sixty cases. In the remaining, further observation was refused by the applicant.

The mortality on these 121 cases is shown to be 126.26% of the M. A. table. It should be stated that no special effort was made to ascertain, through our examiners and the family physician of the applicant, as to the condition of health or whether there had been any additional deaths among the 1,880 cases during the past two years, aside from those reported through our regular channels. This was owing to the fact that so many of our examiners, who made the original examination, and so many of the applicants' physicians, are now in the service of the United States, that it would be difficult to secure any very definite information along these lines. No doubt there are some deaths of which we have no record, but the purpose for which Table No. 2 was intended was to demonstrate that the higher the systolic blood pressure, the greater the mortality, and also to determine, if possible, the point at which the blood pressure should be considered abnormal.

It would seem, from the above, that the conclusions reached in our report to this Association in 1915, were in accordance with the facts.

Dr. Gage—Dr. L. D. Chapin will open the discussion of Dr. Mackenzie's paper.

Dr. Chapin—We are indebted to Dr. Mackenzie for a paper of great value to our Association. His statistics on the frequency of circulatory impairments are impressive, and even more so is his evidence in regard to the transitory nature of some of them, notably arrhythmias and heart murmurs. A very considerable percentage of these cardiac disorders found by the insurance examiners are really functional, and I agree heartily with Dr. Mackenzie, that in justice to both applicant and the company, these cases should be followed up.

Rapid pulse at examination is common, and the applicant should be given ample opportunity to show whether his pulse rate is persistently above ninety or not.

In regard to the arrhythmias, I agree in the main with the writer. Sinus arrhythmias is really a normal rhythm, arising at the normal source, presenting gradual variations in rate under varying physiological conditions. It has no pathological significance and should not bar an applicant from life insurance. Fortunately, it is easily differentiated from the important arrhythmias, and any competent examiner should be able to recognize it.

When it comes to premature contractions, or extra systoles, I am a little more conservative than Dr. Mackenzie, and a little more so than I was myself a year ago. Last year I suggested that if on careful observation over a sufficient period, there could be found no other abnormality in the cardio-vascular system, and the heart responded normally to functional tests, the risk could safely be accepted at standard rates. This is essentially Dr. Mackenzie's position to-day, with a slight modification for applicants over fifty years of age. Of course it is true that the majority of hearts which show premature contractions never present more profound derangements of rhythm, but these contractions occur as the result of abnormal impulse formation and are therefore of pathological significance. They have the same pathological basis as the more

serious disorders of rhythm. The decision is a close one, but my company is not yet ready to accept at standard rates applicants with extra systoles at examination. The recognition of extra systoles is not difficult, but as Dr. Mackenzie says, the average examiner will need instruction on this point.

In regard to the more serious disorders of rhythm, I of course agree entirely with the writer. No person subject to attacks of paroxysmal tachycardia can be considered for life insurance, even if the attacks are brief and infrequent, and the heart absolutely normal in the intervals. The mere history of it need not bar from insurance, although I should want to know that the applicant had been free from this abnormality for a good many years. Auricular flutter and fibrillation are of course both prohibitory, as is also alternation of the pulse. Heart block when present is of course a bar to insurance, but the damage to the myocardium may be only transient, as for example, in some of the acute infections, so that a history of heart block, unless recent, should not in itself be an impairment.

Dr. Mackenzie's statistics on heart murmurs are very interesting, especially his figures showing that murmurs do disappear. His quotations from authorities illustrate the almost revolutionary change in opinion on this subject which has taken place in recent years. Christian goes so far as to say that systolic murmurs are generally not important and that men with functional murmurs are fit for military service. If they are fit for military service, they are surely entitled to life insurance at standard rates. Of course the difficulty lies in selecting the functional murmurs. In order to do this, our examiners will need very careful instruction along the lines suggested by Dr. Mackenzie. Lord says that functional murmurs are more common than organic ones, and that 60% of hospital patients show them. He divides functional murmurs into two types, both systolic in time; (1) a soft, blowing murmur heard over the upper præcordia and infraclavicular region, loudest at the second intercostal space, and (2) a similar murmur loudest at the apex, and also audible in the left axilla and

back. The first he explains as due to dilatation of the pulmonary artery and conus arteriosus; the second, as due to flabby dilatation of the mitral ring.

The company of which I am a representative does no sub-standard business and accepts no applicant with a heart murmur. If Lord's explanation of functional murmurs is correct, we do not want them. There may be no organic disease of the heart, but the man who has a functional murmur is not a standard risk. A condition which is found at least twice as often in hospital patients as in healthy individuals is not desirable in an applicant for insurance. On the other hand, Dr. Mackenzie has shown us that functional murmurs often disappear, and frequently in a remarkably short time. As soon as such a murmur has disappeared, or in a reasonable time thereafter, the subject is surely entitled to insurance at standard rates.

Dr. Gage—When I was making up the program, I invited Dr. Rogers to say something about heart murmurs. He declined because he was afraid there was "too much Rogers" in the meeting. I do not think so, and I know you do not think so, and we should all be very glad to hear from Dr. Rogers on this subject.

Dr. Rogers—I do not know how much of Dr. Mackenzie's paper I can agree with, but there is quite a lot that I disagree with. I agree very heartily with Dr. Chapin, assuming that he is speaking of the insurability of these risks from the standpoint of a company that does only a standard business. The so-called functional heart murmur I believe is an impairment. I doubt very much that any life company has a right to take as a standard risk a person who at the time of examination shows a heart murmur, and especially if that heart murmur persists on second or third examinations had at considerable intervals of time. Now, what the reason for the higher mortality is, I am not prepared to say; but I believe that, given a group of so-called functional heart murmurs, you are going to have in that group a mortality substantially in excess of the normal,

and that, from the point of view of our business should be our guide. Later studies may convince me that I am wrong in this view, and I should like to be so convinced.

I do not know that I ever told this Association an experience I had in the West a number of years ago. At the risk of repeating myself and boring you, I am going to tell the story over again. I was called in while on a trip, to examine a heart on appeal, and found a well marked mitral murmur, with a blood pressure of 175 mms. The case was examined by a very expert examiner after I saw him, and fortunately there was also our consulting examiner, one of the best known clinicians in that part of the country. We examined that heart independently and came to our conclusions independently, and we all decided that it was a case of well marked mitral regurgitation. There was something about the case that led me to suspect that there might be an emotional element in it, and I was curious to know how far that extended, and so we fell into conversation about other things, and in the course of half an hour we re-examined him, and that heart murmur had entirely disappeared, and the blood pressure which on first examination had been 175 was now 135. Now I am telling you this from memory, and I may have the figures a little inaccurate, but the point I want to make is this—here we had a person with very well defined heart lesion apparently, which entirely disappeared in thirty minutes, and a blood pressure which fell from 175 to 135 or thereabouts—an enormous drop in blood pressure. The case caused me a great deal of solicitude of mind, because, I questioned, if a well defined heart murmur could disappear so suddenly, almost instantaneously, had we any landmarks left or any anchorage? I was talking shortly after that with a man of very wide medical experience, and he said, trying to look at it from a life insurance point of view—“You did not insure that person as a standard risk, did you?” I told him, no, we did not, but we came awfully near it—that is, we gave him a very slight advance in age. “Well,” he said, “I think you made a mistake, because any mental agitation that will produce so marked a lesion will occur under other

conditions than the incident of a physical examination, and you will have a very highly impaired risk. He might be agitated about his business and get up a blood pressure of 175; he might have a fright and get up a blood pressure of 200. You are dealing with a person whose circulation is decidedly disturbed, and it will probably always be disturbed." That is about the argument that this gentleman gave, and it strikes me as a very sound argument. Now whether these functional heart murmurs, so-called, fall in the same category with the case I have been speaking about, namely, whether they are due to obscure nervous causes, whether they are structural, or whatever the cause is, these functional murmurs so far as I now know will show a substantially higher mortality than the normal. Personally, I think I should quite as freely accept the better class of mitral regurgitations as I would an equal number of cases of so-called functional heart murmurs. I believe that, in saying this, I am representing pretty closely the experience of our company in dealing with a fairly large number of those cases.

I am particularly pleased to hear Dr. Fisher's remarks extending his observations on blood pressures. I shall study the table that he has submitted to-day with a very great deal of interest. I do not know of any single bit of work that has been done in the Association that is more satisfactory than Dr. Fisher's work on blood pressure, because it is giving us a sort of yardstick and measuring rod by which to measure the value of those risks. A good deal of work in that field will have to be done in the future. We are just on the threshold of it, but I think Dr. Fisher's work has shown very clearly that we have in blood pressure observations a very valuable addition to our equipment. It shows that however much we do not know about blood pressure, we do know that a substantial increase in blood pressure is a thing to be avoided.

Dr. Gage—The subject is open for discussion.

Dr. Hamilton—I would like to say a few words in discussing this interesting paper. When Dr. Mackenzie was at work preparing for this meeting, I was asked to look over our statis-

tics in the Sun Life of Canada, with respect to our heart cases. We have been accepting heart cases, for many years under the direction of Dr. Wilkins and since his death under my own recommendations. We have a special rate, as many of you know, for these cases, but I have always entertained the idea that an injustice was done to many of them because of the high rates which we have imposed upon them, classifying them all frankly under one head, that is, cases of heart murmurs. We are more and more convinced that this is far from scientific. An analysis of these cases has been rather unsatisfactory, while the number is so small that I at first hesitated to make any remark on them. However, after observing yesterday how closely the smaller group cases, as presented by some of our members, corresponded in their results with the larger group cases, in other words, how close the correspondence was regardless of the number upon which the calculations were based, I was encouraged to bring these cases before you.

In our analyses of these cases, it has been our aim to decide which to call organic cases. We have traced a history of rheumatism, of hypertrophy, of murmurs transmitted to the apex, and in discussing these, I refer only to the mitral cases. Thus, we have separated a group which are *organic cases*. They have always a murmur of course, and one or the other of the following—they have a transmitted murmur to the left side, a history of rheumatism, or they have hypertrophy. In this group, which we have called a definite organic group, are found only sixty-four cases of accepted risks. Now in these sixty-four cases we had a mortality of six as against 3.6 expected—a double mortality.

We had another group of cases which are murmur cases, so to speak (I am dealing with apex murmurs), in which no reference to rheumatism, hypertrophy, or transmission of murmur was recorded. We have put those down in a class by themselves, fifty-three in number, with one death, as against 3.6% expected.

Putting these two classes together, we have seven deaths

in 117 cases, the aggregate of expected deaths being 7.2. It works out pretty well viewed from this standpoint.

I think, however, we have imposed too heavy a tax, or too heavy terms upon those cases which are mitral systolic murmur cases alone. I am quite in accord with what Dr. Rogers says concerning heart murmurs. Notwithstanding the advance which has been made in the clinical examination of hearts, we are still in doubt as to what is an organic murmur and what is an inorganic murmur, and no matter how carefully the electro-cardiographic work is done one may still be at a loss to distinguish between organic and inorganic murmurs. I frequently doubt the examiner who says there is no hypertrophy. He is making a statement that means a great deal. As an instance of this, one of our best examiners, not long since, returned the statement on paper that the applicant had no hypertrophy. He also recorded the statement that the applicant was able to go up and down stairs without any increase in his heart rate. He described a murmur at the apex, systolic, and somewhat transmitted into the axilla, and on account of this not markedly unfavorable report, which both my assistant and I went over carefully, we were inclined to offer liberal terms, and finally gave him a rate lower than the usual heart terms, because we are trying to do justice both to the applicant and to the company. I had the privilege of studying this applicant clinically, without knowing until later that I had passed him in the insurance office only a few weeks before. He died, and presented on autopsy the most marked hypertrophy that we had ever seen. The thrill which I demonstrated at the base was a thrill which was audible, so to speak, the thrill of aortic stenosis. The man died of an acute infective ulcerative endocarditis, within five weeks of his examination for insurance. We have ample evidence of a long standing valvular disease. I look on this case as one of many. I do not know where the examination was made, whether in the dark or in the light, but the point of my statement is this, that hypertrophy is very difficult to make out by many men. Very few men will palpate a heart for us as they palpate it for a

clinical examination. If the palpation and inspection of the heart had been made properly there would have been no difficulty in making a diagnosis, and had diagnosis of aortic stenosis been made, we should not have accepted the case.

Another point which I wish to emphasize is the matter of blood pressure, and of the variability, of which Dr. Rogers has spoken. We have had a like experience, so far as blood pressure is concerned, in a risk very importunately asked about in Montreal. The variations were perhaps not so great as the one Dr. Rogers describes, but the blood pressure went from 163 down to 140, and this in the course of a few days. At first we offered a short term Endowment with a lien, and afterwards, because of observations made by myself and my assistants, we decided to take the risk on the Endowment plan alone.

Clinically, some observations at the Royal Victoria Hospital also show, under certain conditions, the marked variability of the diastolic pressure. We have been taught that diastolic pressure is the most stable of the pressures. These patients, showing surprising variability of diastolic pressure were subjects of orthostatic albuminuria. The change under observation was occasionally from 60 to even 100 or 105—usually from 60 to 80 or 85, when subjected to postural changes. I only mention this to show how, after all, we are only groping our way along to a conclusion concerning these pressures. Particularly is this true regarding diastolic pressure.

Dr. Fisher—I believe that I am chairman of the committee on diastolic pressure. I should like to have the impressions of those here as to just along what line we are to investigate. I think we will never reach anything until we have investigated along the lines we followed in investigating the systolic pressure. We have for a number of years in our own Home Office examined the diastolic pressure, and we have for a number of years kept tab wherever the diastolic pressure was 95 or over, and where a pulse pressure was below 25 or above 60. I should like to have an expression of opinion as to just what we should look for in those cases. I think also that we must determine

at what point exactly we shall take the diastolic pressure. We are teaching our examiners, and we have pamphlets, and whenever we feel that the doctor does not understand the point at which the diastolic should be taken, we send him one of these circulars. I should like to come to some understanding as to just where the diastolic is taken. It seems to me if we designate the last loud tone we get it more accurately than to say, where the sound disappears. I should like to ask the Chairman to call on Dr. Cook for some suggestions on this subject.

Dr. Gage—Has Dr. Cook any remarks to make?

Dr. Cook—We are merely on the threshold of this whole subject of blood pressure. I do feel that it is absolutely essential that we should come to some definite conclusion as to where the diastolic reading is to be taken. When the medical schools of the country are not unanimous on this point, I think that Dr. Fisher is absolutely right that this Association should lead the way by perhaps appointing a committee to recommend a definite method of procedure to all examiners of the Association, just as has been done in the interpretation of urinalysis, because even under one direction it is difficult enough for the average practitioner to determine, and surely more so, when his medical school teaches one thing and the insurance companies something different. I think we can hardly expect that our tabulated statistics are going to show any clean-cut, accurate results under such conditions.

I have been collecting during the last few weeks several expressions of opinion from some of the leading clinicians in the country, men who are teaching our examiners as well as post-graduate students. I will take the liberty of reading three or four:

The first is from Dr. T. Dock.

168 Twenty-Eighth Annual Meeting

WASHINGTON UNIVERSITY MEDICAL SCHOOL

600 South Kingshighway

Barnes Hospital

Department of Internal Medicine

SAINT LOUIS, October 12, 1917.

"DR. HENRY WIREMAN COOK,

"c/o Dr. HOMER GAGE, Worcester, Mass.

"DEAR DR. COOK:

"In answer to yours of the 9th, we have been in the habit here of taking the beginning of the fourth phase as the index to the diastolic blood pressure. In addition to the works that have led me to think this a useful point, I have been particularly impressed by the work of my colleagues Taussig and Cook, whose article on "the determination of diastolic pressure in aortic regurgitation" discusses some work they did very fully. See the *Archives of Internal Medicine*, May, 1913, vol. xi., p. 542.

"Very truly yours,

"Signed T. Dock."

As you see, he expresses the fourth phase as being a "useful" point—not necessarily as a proper point but useful.

Dr. Alex. Lambert is in France, but I have the following letter from Dr. Nellis B. Foster, who is now professor of medicine at Ann Arbor, and who was Dr. Lambert's associate at the College of Physicians and Surgeons, New York.

"BASE HOSPITAL, 79th. Div. N. A.

"CAMP MEADE, MD.

"HENRY W. COOK, M.D.,

"Northwestern Life Insurance Company,
Minneapolis.

"MY DEAR HENRY:

"Your letter at hand. There is so much divergence of opinion on the question of the diastolic reading that in my

clinic we adopt an arbitrary rule and at the vanishing sound. This may be a little too low but the discrepancy is of no moment from a clinical point of view. It is not practical to teach groups of students nor the practicing physician any refinement of method.

"I trust this answers your question.

"Yours cordially,

"(Signed) N. B. FOSTER,

"Major, M.R.C. Chief, Medical Service."

This opinion represents a considerable group among insurance companies. I know that a number of examiners are acting under instruction to take the vanishing point of all sounds, although we know that it is not clinically accurate, and that is what is being taught at Ann Arbor, and I think probably at the Physicians and Surgeons. Perhaps some of the New York men will be able to tell us definitely about that.

Dr. L. G. Rowntree writes as follows:

"MINNEAPOLIS, October 15, 1917.

"For the diastolic pressure we teach the students to consider as diastolic pressure the point at which the sound suddenly and definitely decreases.

"We do not believe that the cessation of sound really represents true diastolic pressure, and have been teaching the students accordingly to consider the diastolic pressure indicated above.

"(Signed) L. G. ROWNTREE,

"Professor of Medicine,

"University of Minnesota."

The most interesting letter that I have is from Dr. Theodore C. Janeway, Professor of Medicine at Johns Hopkins, and Major in the M.O.R.C., U.S.A. who I think, preëminently knows more about blood pressure than anyone else, and not from a clinical point of view alone, but he takes our insurance statistics into consideration in his interpretations. He says:

170 Twenty-Eighth Annual Meeting

"I have always used the point of sharp change from the loud pistol-shot sound to the dull sound, that is, the end of the third phase, as the criterion of diastolic pressure."

(As I interpret these four men, none of them take the diastolic at exactly the same point.)

". . . When this cannot be determined, I do not think the estimate of diastolic pressure is worth much. I think the work of McWilliams . . . on the excised artery . . . shows the validity of this criterion, not as an absolute guide, but an approximation of clinical value. . . . So far as the army goes, I have entrusted thus far to our trained examiners, and have not attempted instructions as to methods. . . . One danger in the use of the auscultatory method by the inexpert has been proven to me . . . namely, the occasional large error in estimating the systolic pressure, missing the first phase. . . . I feel sure that the ordinary palpatory method of estimating systolic pressure should never be omitted. Even good students can go far wrong, and I am sure that your examiners might make bad breaks, unless you insist on palpatory as well as auscultatory readings. . . ."

With this very large divergence among the very best clinicians (and I think that these four probably represent the best type of teachers in this country to-day, including the present army instructors), with their inability to agree upon the same phase, and knowing the variation of insurance companies, I think it would be a very great advance in clinical medicine, as well as in insurance medicine, if we could come to some definite determination, and all of us recommend to our examiners the same phase and the same method of taking blood pressure, and perhaps with that recommendation we should ask our examiners to always confirm their auscultatory estimation by palpation, and where there is a wide discrepancy, give us the benefit of both.

Dr. Chapin—I would like to ask just what is the average variation?

Dr. Cook—Five to ten points.

Dr. Chapin—When you consider the inaccuracy of the examiner in the field, is it not better to have the entire vanishing point accepted? Then we know exactly what we are dealing with.

Dr. Porter—During the past year, gentlemen, I have systematically taken both the palpatory and the auscultatory readings, with a view to determining the question under discussion. As a result, I have found that there is a variation in the two readings of from 6 to 12 mms. I followed it up with great regularity, and have had a number of our examiners in New York City doing the same thing, as well as some of our Referees in various parts of the country. That is a big variation, particularly when it comes to the border-line readings of 150 to 160, wherever you may place your limit. A difference of that much means the acceptance or declination of the risk, if it be found on two or three readings, and it means that one company takes a given action which may be quite different from that of another, which is unfortunate. It interferes with scientific results and observations, particularly with statistical results, to have such divergence, influencing a large percentage of cases at the maximum point. As an aid, therefore, in obtaining accurate results, experienced examiners should be instructed to take both readings.

In my judgment the most important question to be determined is the exact point at which a diastolic reading should be taken, and I am delighted to have it come up at this time, and I trust that the President will take action, in view of the recommendations that have already been made, so that we may all determine definitely where the diastolic reading should be taken. For a period of nearly two years, I gave instructions to my medical examiners, and to the Referees, to take at the vanishing point, the final disappearance of sound, believing we could get more uniform results with inexperienced examiners than we could in trying to determine when the sudden drop from the sharp sound to a dull sound took place. The latter is very inconstant and does not always take place.

Sometimes it is an indefinite gradation of sounds and one does not get the sharp change, and no man however capable can take an intelligent reading at that point, unless it is very clear and well defined. It needs a man with a sharp ear and good stethoscope properly applied, and unless you use a sphygmometroscope you will find a great variation in your readings. The sphygmometroscope, by the way, is a very valuable addition to our equipment, in that it gives a uniform pressure, the only variation being with an unusually large or small arm. It should be borne in mind that the point of final disappearance of the sound will vary according to the acuteness of hearing of the examiner. Furthermore, taking the reading at the vanishing point will give a greater pulse pressure, frequently fifty or more, so that a maximum pulse pressure of sixty may be accepted. If the diastolic reading is taken by all, just before the final disappearance of the sound, greater uniformity will result, and I would suggest the adoption of this practice.

We must agree on a definite point, and we must determine what our limit is going to be for diastolic and pulse pressure. This has already been thrashed out on systolic. I have conferred with a number of the most careful observers, including Janeway, Evans, and Hart, and the general consensus of opinion seems to be that we should regard with disfavor a diastolic above 105. Anything above 100 is of course suspicious. One company puts the limit at 102 and another at 108; one company will take a case, another will decline it; all of which is unfortunate and precludes accurate scientific study of the subject. The minimum diastolic I think is an open question upon which none of us are quite prepared as yet to place a limit. All agree that the diastolic is going to be the reading of the first importance and we must have uniformity.

I want to express my appreciation of Dr. Mackenzie's admirable paper on the subject of circulatory impairments. Of course its scope is too broad to permit of extended discussion at this time, but I must refer briefly to the question of cardiac murmurs. The most important point in the whole subject is that sound which is heard frequently in the second

space to the left of the sternum, with maximum intensity there, but heard all over that area, not due to valvular defect, which has been termed a functional murmur. If there is an organic valvular murmur, the function is disturbed. The function of the heart is wrong, and the man is a bad risk. Why, then, use the term "functional" to describe something which we are to consider of no significance—that is, sounds that are not due to organic changes. Let us use rather the terms "organic" and "inorganic." According to my acceptance of the matter, based upon my own observations and numerous conferences with the leading experts of the country, these sounds should be considered as pressure murmurs. Let us call them that, either pressure sounds, or inorganic; rather than use the term functional, which is confusing and misleading. We should in our nomenclature eliminate that term functional, as referring to these sounds which, I think, the majority of us are convinced are due to intra-thoracic pressure upon the thinner wall of the right ventricle at the infundibulum (conus arteriosus) or upon the pulmonary artery. In this area the fact that the wall of the right ventricle is only $\frac{1}{3}$ as thick as that of the left will explain the constant character of the sounds due to pressure upon and collapse of the right ventricular wall at each systole. It is very easily demonstrable that in the heart with each contraction you may have a certain pressure upon the upper part of the right ventricle which will produce a systolic murmur which might be constant, although at a certain phase of the respiration there is such a difference in the intra-thoracic pressure that it might disappear, but pressure, rather than dilatation, I believe accounts for the murmur at that particular point. Let us determine then, whether the murmur is organic or inorganic. Organic on standard rates ordinarily cannot be accepted. Inorganic are acceptable where the heart sounds are clear and rhythm normal.

Dr. Gage—Is there any further discussion?

Dr. Old—Mr. President and Gentlemen: I believe of the young men under thirty years of age, who come to the Home Office for examination, that fully one-third of our rejections are

on account of heart murmur. I wish I could agree with Dr. Mackenzie that the so-called functional heart murmur is so common. We find in cases of organic heart trouble in these young men, that the causes are either some acute infection or athletics. They have one common sign, *i.e.*, a systolic blood pressure running 15 mms. or 20 mms. above the average for the age. In fact, after having had the applicant seated at the desk for ten to fifteen minutes, in order to take his history, and finding his pulse rate within normal limits, which would eliminate excitement if we find a markedly increased blood pressure, we usually expect to find one of three things, a heart murmur, sugar in the urine, or albumin. Knowing how difficult it is, by concentrating merely on the murmur, to say whether it is organic or inorganic, we then go into the history, taking into consideration what causes these heart conditions in young men, and we usually find that they give histories since childhood of having had a good many attacks of tonsillitis or quinsy, or we find that during their high-school and college days they were on the track team, or they rowed on the crew. With such a history, finding a murmur and an increased blood pressure we classify them as organic. Personally, the only functional murmurs that I call functional murmurs, are cases that are in bed with some acute infection or those with certain forms of anemia. In these athletes, when we find increased blood pressure, we are suspicious of organic changes in the heart muscle and we usually find the murmur is brought out very distinctly on examination made after the man has taken exercise and is in the reclining position, and, as Dr. Rogers has well said, and I certainly agree with him, a man with a well marked mitral regurgitant murmur, or a murmur that is loud and distinct at all times, has a better functioning heart than these hearts in which the murmur is only brought out by some exercise.

We have, of course, been paying a good deal of attention to the diastolic pressure, and we have been scrutinizing cases of applicants under forty who show a diastolic pressure of one hundred. In other words, a diastolic pressure of one hundred,

in a man under forty, is certainly suspicious. Over forty, 105 mms. or over. We have also been particularly struck with the fact that in older men the systolic pressures vary. I think it is a well known fact that in beginning arteriosclerosis, instead of obtaining a constant high systolic, you get a variable systolic pressure. One day it will be high and possibly the next day you will find it 15 mms. or 20 mms. lower. It is in such cases that the diastolic pressure is of great importance. You will find that the diastolic will certainly remain above one hundred.

Knowing the large number of cases of syphilis that are present in this country and elsewhere, and cases in which the persons themselves never had any idea that they were thus infected, and knowing that syphilis often manifests itself in the cardio-vascular system, and especially in the aorta, we have been very much interested to find that in men over 45, who show a high systolic and a high diastolic, with possibly weak heart sounds, that after exercise a distinct systolic blow can be detected along the aorta.

As far as the diastolic pressure with the men in the field is concerned, I believe with Dr. Lambert, and as Dr. Porter said, that we must let the men take the diastolic when the sound disappears. It is out of the question to expect them to get it at the end of the third or at the beginning of the fourth phase, for many men are tone deaf. I venture to state that if we had a case here, and every man in this room was asked where the diastolic pressure was, we would get a variation of from five to six millimeters.

Dr. Gage—I will ask Dr. Mackenzie to close the discussion of his paper.

Dr. Mackenzie—It will be impossible for me in the time at my disposal to answer some of the criticisms that have been made concerning the conclusions in my paper. I wish it were possible, because I am satisfied that there are a great many murmurs heard that have no organic basis and that this is often borne out by autopsy reports. Now there must be some functional or at least inorganic cause for murmurs when

cases which have shown murmurs come to autopsy from some other cause than heart disease, and show absolutely no impairment of the heart valves. This, I understand, is not an uncommon occurrence. I am not going to say any more regarding valvular disease. Personally, I am only advocating at this time the taking of mitral regurgitation. I think it would be unwise for any company to take any other form of heart disease until sufficient data had been obtained to indicate its effect and from it the drawing of conclusions as to what mortality might be expected from mitral stenosis and affections of the other valves. Mitral regurgitation is the least serious of the valve infections, although the most frequent.

I do not believe it makes much difference whether you call a murmur functional or inorganic. The term, to my mind, simply means for us that there is no organic change in the heart that will constitute a serious impairment from an insurance standpoint.

Now with regard to pulse pressure and the point at which the diastolic should be taken. We started two or three years ago, asking our examiners to give us the readings at both the fourth and fifth points. This was very nice in theory, but worked out poorly in practice, for the reason that the examiners, as a general thing, gave us the reading at but one point, and we did not know which point was used. We have, therefore, stopped asking our examiners for the fourth point, and are now asking them for the reading at the point of disappearance of all sound. I think it very doubtful that you get a difference between the fourth and fifth points of 12 mms. in many cases. The average I believe, lies somewhere between 5 and 8 mms. I do not think the difference of a few millimeters, one way or the other, is very significant, provided a case is absolutely good in every other respect, as we have to take so many things into consideration in determining the exact significance of the blood pressure.

With regard to pulse pressure, I read an article not long ago, by Dr. Warfield, in which he gives the normal limits for

pulse pressure as 30 to 50 mm. He considers anything over 50 or under 30 abnormal. That may be all right from a clinical standpoint, but I do not think it is all right from an insurance standpoint. I think our limits must be greater than 30 and 50 mm. In our company we have been accepting applicants with pulse pressures of from 25 to 60 mm. In a young fellow whose high pulse pressure is apparently due to nervousness, but who is otherwise a good risk, we have gone as high as 70 mm., but those are rare cases, and I think that in a man over 40 a pulse pressure of 60 mm. is certainly a subject for grave consideration. We have always to be on the lookout for arteriosclerosis in such cases, and to think of the possibility of aortic regurgitation.

I want to thank the gentlemen who have taken part in this discussion. I wish we had had a lot more discussion on the heart, but at the present time blood pressure seems to be usurping the place of almost everything else in the minds of insurance men. It seems to me better, however, that we clearly understand the significance of blood pressure at the present time than the value of heart murmurs, for the reason that it covers a much wider field and is more frequently a subject for serious consideration in our every day work.

Dr. Gage introduced Dr. Jaquith, the newly elected President.

Dr. Jaquith—Again I want to thank you, gentlemen, from the very bottom of my heart for the honor that you have conferred upon me.

Dr. Jaquith was greeted with applause.

On motion, the meeting adjourned, *sine die*.

The Annual Dinner of the Association was held on the evening of Wednesday, October 17th, at the Worcester Club. The following members were present at the dinner:

178 Twenty-Eighth Annual Meeting

MEMBERS PRESENT AT THE DINNER

Dr. H. B. Anderson	Dr. R. B. Ober
" Wm. Armstrong	" Herbert Old
" W. B. Bartlett	" S. H. Parker
" W. W. Beckett	" Wm. Evelyn Porter
" L. D. Chapin	" O. H. Rogers
" C. L. Christiernin	" E. K. Root
" Henry Colt	" W. W. Rose
" E. W. Dwight	" R. L. Rowley
" O. M. Eakins	" H. C. Scadding
" Z. Taylor Emery	" S. B. Scholz, Jr.
" John W. Fisher	" Morton Snow
" Homer Gage	" G. S. Stebbins
" F. L. Grosvenor	" Harry Toulmin
" George C. Hall	" G. A. Van Wagenen
" J. B. Hall	" Wm. R. Ward
" W. F. Hamilton	" J. H. Webb
" W. G. Hutchinson	" W. H. Wehner
" W. A. Jaquith	" F. S. Weisse
" A. S. Knight	" F. C. Wells
" R. L. Lounsberry	" F. L. Wells
" H. A. Martelle	" C. D. Wheeler
" L. F. Mackenzie	" T. H. Willard
" T. F. McMahon	" M. C. Wilson
" John C. Medd	" Glenn Wood
" W. D. Morgan	" A. B. Wright
" W. Muhlberg	

JOINT MEETING OF MEMBERS OF THE ACTUARIAL SOCIETY AND THE ASSO- CIATION OF LIFE INSURANCE MEDICAL DIRECTORS OF AMERICA.

The first joint meeting was held at the Hotel Astor in the morning and afternoon of Friday, March 30, 1917, with a social meeting and dinner in the evening. The business meeting—Mr. Arthur Hunter, President of the Actuarial Society and Dr. Homer Gage, President of the Association of Life Insurance Medical Directors, presiding—was largely attended, there being present at one time about 150 members of the two Societies, and great interest was shown by those present in the subjects and the ensuing discussion on the different topics.

The subjects for and the leaders of discussion at the business meeting were:

I. INSURANCE OF WOMEN.

Dr. E. W. Dwight, *Medical Director*, New England Mutual Life Insurance Company, Boston, Mass.

Dr. Henry Moir, *Actuary*, Home Life Insurance Co., New York.

Dr. W. A. Jaquith, *Medical Director*, Prudential Insurance Company, Newark, N. J.

Mr. Arthur B. Wood, *Actuary*, Sun Life Assurance Company, Montreal, Canada.

2. THE PROBLEM OF SELECTION FROM THE STANDPOINT OF AN EXECUTIVE OFFICER.

Mr. J. K. Gore, *Vice-President*, Prudential Ins. Co., Newark, N. J.

Dr. G. M. White, *2d Vice-President*, Mutual Life Ins. Co. of N. Y.

Mr. E. E. Rhodes, *Vice-President*, Mutual Benefit Life Insurance Co., Newark, N. J.

3. PERIODICAL CONFERENCES BETWEEN MEDICAL DIRECTORS AND ACTUARIES OF A COMPANY AND THE SUBJECTS WHICH ARE MOST SUITABLE FOR DISCUSSION.

Dr. Brandreth Symonds, *Chief Medical Director*, Mutual Life Insurance Co. of New York.

Mr. Arthur Hunter, *Actuary*, New York Life Insurance Co.

Dr. J. W. Fisher, *Medical Director*, Northwestern Mutual Life Insurance Company.

Mr. D. E. Kilgour, *Actuary*, North American Life Assurance Company, Toronto, Canada.

Mr. E. B. Morris, *Actuary*, Travelers Insurance Co., Hartford, Conn.

4. COÖPERATION BETWEEN MEDICAL DIRECTOR AND ACTUARY IN THE SELECTION OF RISKS AND IN PROBLEMS REGARDING THE REINSTATEMENT OF RISKS.

Dr. T. H. Willard, *Medical Director*, Metropolitan Life Insurance Co., N. Y.

Mr. R. Henderson, *Actuary*, Equitable Life Assurance Society, N. Y.

Dr. Harry Toulmin, *Medical Director*, Penn Mutual Life Ins. Co., Philadelphia, Pa.

Mr. W. A. Hutcheson, *Actuary*, Mutual Life Ins. Co. of N. Y.

5. THE FUNCTIONS OF A COMMITTEE FOR THE REVIEW OF BORDERLINE, UNDER-AVERAGE AND DIFFICULT CASES.

Dr. T. H. Rockwell, *Medical Director*, Equitable Life Assurance Society, N. Y.

Mr. A. A. Welch, *Vice-President*, Phoenix Mutual Life Ins. Co., Hartford, Conn.

Dr. M. L. King, *Medical Director*, New York Life Ins. Co., N. Y.

Mr. J. B. Gibb, *Actuary*, Penn Mutual Life Ins. Co., Philadelphia, Pa.

Mr. Hunter, President of the Actuarial Society, made the following address with reference to his subject:

THE ADVANTAGES OF PERIODICAL CONFERENCES
BETWEEN MEDICAL DIRECTORS AND
ACTUARIES OF EACH COMPANY

BY ARTHUR HUNTER

For the last three years conferences have been held between the Actuaries and the Medical Directors of the New York Life, such conferences starting in an informal way without a very definite program, except that we desired to obtain one another's point of view and to add to our knowledge. At first the meetings were held weekly after the usual office hours, but at the present time they are held at longer intervals, and commence at half past three o'clock. In addition to the members of the Medical Board and the Actuaries, there is frequently present one of the Vice-Presidents of the Company, while one or more members of the Committee on Review are also present.

We first took up the reports of the Medico-Actuarial Investigation, each class of any size in that investigation being considered separately. Dr. Rogers gave his interpretation of the class from the medical viewpoint, while I gave it from the actuarial standpoint. This was followed by a general discussion and by the asking of questions. In connection with the analysis of the various classes in the Medico-Actuarial Investigation, the experience of the New York Life was also given; and where there was a material difference in the mortality in corresponding classes, the reason for this difference

was sought. For example, the experience of the New York Life in its under-average class on men with a history of syphilis was more favorable than that of the forty-three companies, while the reverse was true in connection with cases of a history of albumin and those with a family history of tuberculosis. This occasioned an extended discussion which necessitated an analysis of the underlying conditions. In the cases accepted by the New York Life with an extra premium or otherwise treated as sub-standard it was accordingly to be expected that the persons with albumin or with a family history of tuberculosis would on the average be more seriously impaired than those accepted on "standard" plans by other companies. The favorable experience of the New York Life on persons with a history of syphilis was probably due to great care resulting from a knowledge gained twenty years ago that a distinctly higher mortality than the normal might be expected even in cases apparently cured.

It soon developed that other lines of investigation could be taken up to the mutual advantage of the medical men and of the actuaries. Thus the rules which were promulgated by our governing body, the Office Committee, and the reports made by myself were discussed and explained at these meetings if they in any way touched the Medical Department or if the information would add to the general knowledge of the medical men or of the actuaries.

Again, some of the papers in the Proceedings of the Medical Directors' Association were analyzed. One of these papers which was thoroughly discussed at more than one meeting dealt with the mortality among persons who were found to have albumin, casts, or sugar at date of examination. The Company on whose statistics the report was based showed a favorable mortality in persons accepted with these defects, in fact more favorable than the normal in certain groups. This, of course, raised the question in the minds of our medical men whether the statistics of the New York Life were incorrect or out of date as we were charging an extra premium to apparently the same types of risks. Without attempting to

explain the statistics of the other company, it might be well to point out that all their cases were accepted as standard risks, many of them in fact, taken in a super-standard class with a low premium, so that the cases in which albumin, casts, or sugar appeared, must have been very favorable of their type, and it is likely that these defects were found in probably only one of several specimens examined and the tests employed were very difficult. The New York Life statistics, however, were based on cases under which the defect was found in more than one specimen.

One of the interesting pieces of work was a review of the medical blanks. Each section of that form was subject to attack to determine whether it was necessary or not and to find out what useful purpose it served. Furthermore, the forms of other Companies were analyzed and compared with those of the New York Life. One of the questions raised in connection with our new medical blank was whether the Medical Examiner should be required to take the applicant's temperature in all cases or only an afternoon reading on cases (1) of suspected tuberculosis, (2) of young persons very much underweight, (3) of those who had apparently had a recent attack of malaria and (4) of those with a family history of tuberculosis.

Another investigation in connection with the new medical form related to the advisability of testing the reflexes. To assist in our decision, the reflexes were tested of all the applicants appearing at the Home Office for examination during a certain period. There were ten out of several hundred in which the reflexes showed a departure from the normal, but in only one of these did the conditions appear to be sufficiently pronounced to constitute an impairment. Another very interesting investigation at that time was in connection with blood pressure, the Actuaries contributing to this investigation some of the statistics. A free discussion among the medical men resulted in some very desirable changes.

Occasionally certain questions would arise in the mind of an Actuary after reviewing the papers in connection with death

losses and these would be discussed at our joint conferences. These generally consisted of suggestions for the better safeguarding of the Company's interests.

In looking over the minutes of the meeting, I came across such questions as these:

A. How should overweight men be treated who have recently reduced weight by diet or exercise? Should we assume the present weight to be normal or that the spasm of virtue will pass? The general opinion was that he should be treated as if his weight were midway between his present and his former weight.

B. What should be considered the blood pressure when there are considerable differences in three tests? Should it be considered that the first test, if high, was the correct one and that the two lower readings were the result of medication? No rule can be laid down for such cases except that a marked difference in the readings should be looked upon with suspicion and a satisfactory explanation found before the lower pressure should be accepted as normal.

C. Is it feasible to apply the tuberculin test in cases of suspected tuberculosis? Did the Actuaries know of any statistics on this subject? Whether there are available statistics or not, it is generally believed that the tuberculin test is not feasible for applicants for insurance, although it can sometimes be applied in cases for large amounts.

D. Is there likely to be a decreasing extra mortality for a few years following an operation for gastric ulcer? If so, what would be the best method of protecting the Company and also of doing justice to the policyholder after the extra hazard had passed? The mortality following an operation for gastric ulcer apparently decreases. The best way, therefore, to protect the Company and to do justice to the policyholder is to charge an extra premium over a series of years, the period depending upon the time elapsed since the operation. An extra premium, for example, of fifteen dollars per thousand for three years might be charged in the case of a man aged thirty-five who had a successful operation three years ago, provided

no commission was paid on the extra and it was non-participating.

E. What additional hazard is there in connection with nursing in tuberculosis sanatoria? There are no statistics available, and there is a marked difference of opinion among those who have had experience in such sanatoria. It appears, however, to be generally believed that young nurses below the average weight run a distinct risk in nursing persons with tuberculosis.

In connection with the recent extension of permanent disability benefits, I submitted at one of our conferences our experience on four hundred claims for disability benefits with an analysis of the causes. That information may be of interest and is now given:

<i>Causes of Disability</i>	<i>Percentage of total number of disability claims</i>
Tuberculosis.....	42%
Insanity.....	26
Paralysis.....	7
Accident.....	5
Cancer and tumors.....	5
Heart disease.....	2
Blindness.....	2
Rheumatism.....	2
All other causes.....	9
	<hr/> 100%

The types of cases in which fraud seemed comparatively easy under disability claims were discussed and the means of preventing fraud in the future. We also considered what types of cases in the light of our experience should be excluded from the benefits of disability. Our practice of eliminating these benefits in the case of light weight persons with a family history of tuberculosis, and applicants with a history of syphilis was confirmed by experience. It was found advisable also not to grant disability benefits to (1) persons who were totally deaf or very nearly so, (2) those who had had attacks of epilepsy or of insanity in the past, (3) those who had two or more

cases of insanity in the family history, (4) those who had indulged in alcohol to excess within recent years or who now drank freely but not to excess.

In connection with applications to reinstate policies, many questions arise of mutual interest to the two professions, such as: Should an impairment be more liberally treated in an old policyholder than in an applicant for insurance? What effect should a long period of term extension have on our decision in a seriously impaired risk? The practice of a number of companies is to reinstate a policy irrespective of the health of the insured, provided the period of term extension is five years or longer.

An instance of coöperation between the two branches of the service occurred in connection with a history of pellagra. The Medical men and the Actuaries made independent investigations, and after discussion, rules were adopted to protect the Company and also to enable us to make offers on sub-standard plans to such lives. Some of the most valuable information in this line was obtained from the literature on heredity and eugenics. The consensus of opinion of the Actuaries and of the Medical Directors was that persons with a history of pellagra were insurable after two years at least had elapsed since the attack, and provided a substantial extra premium was charged,—for example, ten dollars for four years, if two, and less than three years had elapsed since the attack of pellagra. Where the applicant was living in the house with a person who had pellagra, a small additional mortality should be expected.

At these meetings, the Medical men bring their difficult cases to be discussed and also those for which there is no definite rule. For example:

1. Is there any available material to show the lowest blood pressure in normal individuals in good health? No information on this subject could be obtained, although it was found that persons who had a blood pressure below one hundred were generally looked upon with suspicion.

2. What do statistics show with regard to the longevity

of persons who have lost both arms or both legs? There do not seem to be any available statistics with regard to such persons. It is generally considered that they are slightly sub-standard, however, and are more subject to accident if they are not largely confined to the house. In very favorable cases the custom is to accept on the regular plan for insurance, and in less favorable instances some of the companies limit to short term Endowments.

3. Are there sufficient statistics in existence to determine the hazard from living in the same house with a consumptive? The statistics of the M. A. Investigation were too scanty to yield a definite answer. It was thought that the hazard depends largely on the education of those in the household and the care which they take to prevent infection. Each case, therefore, has to be decided on its merits. On the whole, an extra premium for a short period of years should cover, but this may be waived a few months after the death of the consumptive, provided the insured is then found to be in good health. For example, if the wife of an applicant aged twenty-five, of average weight has consumption, a charge of \$5.00 per thousand might be made for two years but should she die within six months, then a year from the date of the policy the extra premium would be removed if medical examination showed that the insured was in good health. The age and "build" of the applicant should be factors in determining the extra premium.

The most recent subject on which we have been working had been the method of treating cases where there is a history within recent years of heart murmur, albumin, or sugar, with no present impairment at the time of examination. As the Medical Directors painfully recognize, there is no more trying type than that of an applicant who has been examined three months ago by another company and found by three doctors to have an organic heart murmur while we cannot find any trace of it; or, the case of a man who has been declined for sugar by three companies during the last two years and we cannot find a trace on repeated examinations. Is it any wonder that the

harassed Medical Director turns to the actuary for the actual experience on such cases, and is it any wonder that heretofore the Actuary has never thought of recording such types for future investigation? It is very difficult to lay down general rules for the treatment of such cases, as few of them are exactly alike. In the compass of this paper the different types could not be satisfactorily discussed.

These conferences are of distinct value from three stand-points:

First—They bring about greater uniformity in the treatment of applicants for insurance.

Second—They result in the adoption and use of better rules for the treatment of different types of cases, better, because they are the result of free discussion between men whose training has been along different lines.

Third—They stimulate greater efficiency from both Actuaries and Medical men because each one gets a better knowledge of the problems which the other has to face, and recognizes more readily when he should go to the other for advice.

I feel that by these conferences my own knowledge has been greatly increased, my respect for the ability of the medical men in handling their different problems has been heightened, and my outlook has been greatly broadened.

There was a large attendance at the dinner and social meeting in the evening, which was most enjoyable.

The following members of this Association were present at one time or another during the meeting:

Drs. J. L. Adams, H. A. Baker, Charles D. Bennett, E. A. Colton, H. W. Cook, J. N. Coolidge, R. M. Daley, O. M. Eakins, Z. Taylor Emery, J. W. Fisher, Paul FitzGerald, R. A. Fraser, Homer Gage, George C. Hall, Angier B. Hobbs, W. G. Hutchinson, W. A. Jaquith, George E. Kanouse, A. S. Knight, R. L.

Lounsberry, C. B. McCulloch, H. A. Martelle, George L. Megargee, W. Muhlberg, J. Bergen Ogden, J. Allen Patton, John S. Phelps, Joseph E. Pollard, Wm. Evelyn Porter, Albert T. Post, T. H. Rockwell, Robert L. Rowley, G. S. Stebbins, Brandreth Symonds, Harry Toulmin, William R. Ward, W. H. Wehner, J. H. Webb, F. S. Weisse, Frank Wells, F. L. Wells, Charles D. Wheeler, Granville M. White, C. F. S. Whitney, Thomas H. Willard, Glenn Wood and Arthur B. Wright.

(Signed) FANEUIL S. WEISSE,
Secretary.

An Abstract of the Proceedings
OF THE
Association of
Life Insurance Medical Directors
of America.

TWENTY-NINTH ANNUAL MEETING

The Twenty-Ninth Annual Meeting of the Association of Life Insurance Medical Directors of America was held in the Board Room of the Prudential Insurance Company, Newark, N. J., on January 29 and 30, 1919. President Walter A. Jaquith in the chair.

The following members were present at some time during the sessions:

John L. Adams, Charles D. Bennett, Chester T. Brown, Laurence D. Chapin, Charles L. Christiernin, Thomas C. Craig, Robert M. Daley, Olin M. Eakins, Robert A. Fraser, A. H. Gordon, F. L. Grosvenor, George C. Hall, Angier B. Hobbs, William G. Hutchinson, W. A. Jaquith, George E. Kanouse, Morris L. King, Augustus S. Knight, William W. Knight, William P. Lamb, R. L. Lounsberry, Lewis F. Mac-

192 Twenty-Ninth Annual Meeting

Kenzie, O. F. Maxon, Samuel W. Means, Archibald Mercer, J. Allen Patton, W. O. Pauli, John S. Phelps, Joseph E. Pollard, William Evelyn Porter, Albert T. Post, Thomas H. Rockwell, Oscar H. Rogers, Edward K. Root, R. L. Rowley, Eugene F. Russell, H. C. Scadding, S. B. Scholz, Jr., Morton Snow, Howard B. Speer, Paul E. Tiemann, Harry Toulmin, William R. Ward, William Perry Watson, Joseph H. Webb, William H. Wehner, Faneuil S. Weisse, F. C. Wells, Charles D. Wheeler, Thomas H. Willard.

The total attendance at all sessions was fifty.

The names of the following candidates for membership, recommended by the Executive Council, were presented:

Dr. J. P. Turner, Medical Director, Jefferson Standard Life Insurance Company, Greensboro, N. C.

Dr. Frank P. Righter, Medical Director, Atlantic Life Insurance Company, Richmond, Va.

Dr. H. A. Lafleur, Medical Director, Gresham Life Insurance Company, Montreal, Quebec, Canada.

Dr. W. W. Hobson, Assistant Medical Director, Reliance Life Insurance Company, Pittsburgh, Pa.

Dr. James T. Priestley, Medical Director, Royal Union Mutual Life Insurance Company, Des Moines, Iowa.

Dr. Calvin H. English, Medical Director, Lincoln National Life Insurance Company, Fort Wayne, Indiana.

Dr. P. G. Drake, Medical Supervisor, The Guardian Life Insurance Company, New York, N. Y.

Dr. William G. Exton, Assistant Medical Director, Prudential Insurance Company, Newark, N. J.

Dr. Alfred W. Balch, Assistant Medical Director, Metropolitan Life Insurance Company, New York, N. Y.

Dr. Charles P. Clark, Assistant Medical Director, Mutual Benefit Life Ins. Co., Newark, N. J.

Motion was made and carried that the Secretary be instructed to cast a ballot for each of these candidates. Ballot so cast, and the candidates recommended by the Executive Council were declared elected to membership in the Association.

Of the newly elected members, Doctors Turner, Exton, Righter, Drake and Clark were present, and were introduced to the members of the Association.

Motion was made and carried that the reading of the minutes of the last meeting of the Association be dispensed with.

The Secretary read the minutes of the meetings of the Executive Council, of December 13, 1917, January 6, 1918, and November 12, 1918. On motion, these minutes were approved as read.

President W. A. Jaquith then delivered the following address:

ADDRESS BY THE PRESIDENT, W. A. JAQUITH, M. D.

On behalf of myself and my associates in the Medical Department of The Prudential, it gives me much pleasure to welcome you to our Home Office.

We hope to make your sojourn in Newark an agreeable experience and shall consider it a favor if you will make known to us any wish for your comfort and enjoyment which we fail to anticipate.

I wish to thank you for having elected me to the honor-

194 Twenty-Ninth Annual Meeting

able post of President of this Association. I have striven to fulfill the duties which have fallen to me with the best of my endeavors, with a consciousness of the fact that the position has been held by men who are difficult to follow.

At all of our gatherings in recent years, Blood Pressure has been a topic for discussion. Prefatory to presenting some data on this subject, obtained by a study which we have been making in our office, there are several matters I wish to comment on and trust that among the suggestions offered you may think some of them possess sufficient merit to warrant consideration.

It is not my purpose to enter upon a discussion of the great World War, nevertheless, it seems fitting and proper to refer, at least briefly, to the achievements of our Army Medical Corps. In its work at the Front, we may safely say none excelled it in personnel, methods, or organization. It is said that in the early months of the War a roster of our Medical Corps Overseas would have been a sort of "Who's Who" for our most distinguished men in all branches of medicine. In addition to the many eminent physicians and surgeons, vast numbers of the rank and file of the medical profession gave themselves to the Army Service, in all, over 35,000 or nearly 25% of the total number of physicians in the country. The removal from civil practice of so large a number of physicians in many instances made it difficult for insurance companies to secure adequate medical service and if the war had continued our difficulties in having insurance applicants examined undoubtedly would have increased.

Great advances have been made along lines of prevention, salvage, reconstruction, and administration. During the Civil War, there were six (6) times as many deaths from disease as from violence, but in the recent war this condition was reversed. Last March, Surgeon-General Gorgas made the following astonishing announcement: "The world's military hygiene records for deaths from disease have been reduced more than 50% in the United States Army since we entered the war. The record until that time was held by the Japanese, and was

21 deaths per thousand. Deaths in the United States Army have dropped to 10 per thousand."

A problem in medical selection with which we are being confronted is that of the returned soldier. At present I know of no available data which will enable us to determine the effect of gassing and shell-shock on life expectancy. After apparently complete recovery from the attack, in either class of risks, how soon ought an applicant to be considered eligible for insurance at regular rates?

One of the members of our Home Office Medical Staff discussed this question with an examiner in a Canadian city, who had spent a period of three (3) years in Base Hospitals in England and France. His opinion was that it would not be safe to grant insurance on any plan to members of either of the two classes referred to until at least one year after discharge from the army. Perhaps some of our Canadian members are in a position to furnish us with definite information on this point and, if so, we should be glad to hear from them later.

At the Annual Meeting in 1906, printed copies of the papers to be presented were first distributed amongst the members at the opening of the first day's session. More recently the custom followed has been to place copies of the papers in the hands of each member 30 days in advance of the meeting, thus giving any desiring to participate in the discussion ample opportunity to read and digest them. It has seemed to us that, as most of the papers are statistical and require study, much value could be added to them by a free discussion; so this year we have gone a step further and decided to have the papers read by title only, in the belief that the time usually occupied in reading a paper could be utilized to a better advantage in discussing it. The success of the new plan is dependent upon the papers being more generally discussed than has been the case at former meetings.

In the notice of the tentative program sent you last June, it was stated that Dr. Franklin C. Wells would present a paper on Group Insurance, and it is much to be regretted that the Doctor encountered difficulties which prevented him from

196 Twenty-Ninth Annual Meeting

completing it in time for this meeting. The practical wisdom of the individual in insuring his life has its counterpart in employers insuring their employees and, as many of the companies here represented are writing this form of insurance, a paper on the subject would be very valuable. I trust Dr. Wells may find it possible to have his paper ready for presentation at our next Annual Meeting.

Through the labors of individual members, through the deliberations of the Executive Council, and through discussions at our Annual Meetings, much has been accomplished making for improvement in office methods and for standardizing urinalyses and blood-pressure. While we may not expect uniformity in the practice of medical offices in selection of risks, we might consider a question which, when brought forward several years ago, was not looked upon with favor, and that is the adoption of a uniform medical blank.

In 1896 the Medical Officers Association of Great Britain, as the results of prolonged labors of a committee, prepared a form for use of Medical Examiners which was adopted by a number of offices. The medical blank of different insurance companies varies and, as we are frequently called upon to accept medical reports on blanks of other companies, it would seem to me advantageous if we could agree on a uniform medical blank.

Article IV., of our By-laws, reads as follows. "The President shall appoint at the close of each meeting three or four members to prepare papers for the ensuing meeting. Death or resignation from the Association shall constitute the only valid excuses for non-compliance with the President's order." I doubt that this by-law has ever been enforced and, while I met with little difficulty in arranging a program for this meeting, I am of the opinion that a more satisfactory arrangement would be that of having the President, at the close of each meeting, appoint three members to serve as a Committee on Program for the ensuing year's meeting.

Article V., of our By-laws, provides that: "On the morning of the first day of the Annual Meeting, each member present

shall receive from the Secretary a blank ballot on which there shall be a space for each office to be voted for. Each member shall record upon the blank his preference for each office and shall cast his ballot in a receptacle to be provided for that purpose, etc., etc." This method may have worked well with a small membership, but, as the Association is at present constituted, it necessitates the preparation of a large number of ballots, causes confusion, and consumes a great deal of time. We now have a roster of about 150 members and it would seem to me a better plan to have the President appoint three members of the Executive Council to serve as a Nominating Committee.

In our office it has been observed that requests for particulars of impairment codes, which indicate quite clearly what was found by the Reporting Company, are very numerous. It is suggested that an effort be made to reduce to a minimum such requests.

The proceedings of the joint meeting of the Actuarial Society and this Association, which was held in March, 1917, were very interesting and instructive and it is urged that an effort be made to have another such meeting during the current year.

Since our last meeting, at which a preliminary report was made, the Joint Committee of the Actuarial Society and the Association of Life Insurance Medical Directors has completed its report on "Standard Mortality Incident to Variations in Height and Weight Among Men." Doubtless many, if not all present, have obtained copies of the report and it is hoped there may be an opportunity for discussing it at this meeting.

Two years ago Dr. Chas. Mayo extended to us a cordial invitation to analyze the records of the Mayo Foundation in certain classes of cases. Mr. Arthur Hunter, Actuary of the New York Life, volunteered to conduct the inquiry and I am pleased to be able to inform you that his report on "Mortality Results of Operations from Gastric and Duodenal Ulcer" has been completed and will be presented this afternoon.

Dr. Lee K. Frankel, President of the American Public Health Association, has been invited to attend to-morrow

198 Twenty-Ninth Annual Meeting

morning's session and place before us their plans and policies as they relate to life insurance companies.

It is gratifying to note that during the past year we have not lost any members through death and that ten new names have been added to our membership.

President Jaquith then read the following paper, entitled:

A STUDY OF THE FOURTH PHASE OF THE DIASTOLIC PRESSURE

BY W. A. JAQUITH, M.D.

Blood-pressure, although so much time and thought has been expended on it in recent years, still presents numerous problems for consideration. Among these is the point at which the true diastolic pressure should be read. Most authorities seem agreed that the beginning of the fourth phase represents this pressure, but, as difficulty is at times experienced in reading this point, we have recently undertaken an investigation to determine, if possible, whether it, or the disappearance of all sound, will yield the most accurate and uniform results.

A number of examiners were selected from whom, owing to their experience and other qualifications, it was believed reliable readings could be obtained. Fifty-three of those to whom special letters were written furnished the 754 reports from which this analysis has been made.

The fourth point could not be determined by six (11.3%) examiners in eight (1.06%) cases. The fact that a point supposed to be the beginning of the fourth phase was reported in nearly 99% of the cases would lend support to the use of this point rather than the disappearance of sound for taking the diastolic reading.

Here several questions presented themselves. Was the fourth point as recorded reasonably uniform and accurate? What was the normal average length of the fourth phase? Were departures from the normal for this phase due to a higher 4th point, a lower 5th point, or to a combination of these?

Without entering into methods of procedure when compiling the data, the following tables are presented in the belief that they at least throw some light on the above questions.

Other interesting features were noted during the analysis, but, owing to the small number of records secured, will not be referred to, as it is intended to continue the investigation until sufficient cards are obtained to warrant reliable conclusions. These it is hoped to have in time for the next meeting of the Association.

TABLE I
4TH PHASE BY PERCENTAGES AND EXAMINERS

EXR.	CASES	PHASE	PHASE	PHASE	PHASE
		2-6 mm.	7-8 mm.	9-10 mm.	Over 10 mm.
A	48	52.07	35.41	6.25	6.25
B	31	87.07	12.90		
C	181	98.91		0.55	0.55
D	35	74.28	17.14	8.57	
E	36	100.00			
F	23	34.77	34.77	8.60	21.73
G	21	42.84	4.76	52.37	
H	29	10.34	31.03	31.03	27.58
K	342	73.65	11.39	9.06	5.84
M	746	75.71	11.25	8.04	4.95

The above table shows quite conclusively there are decided differences in the average readings by different examiners, and often in the readings of the same examiner when determining the fourth and fifth points. Percentages rather than number of cases are used in this table for ease of comparison. The letters A to H represent the eight examiners each of whom reported over twenty cases, K the forty-five examiners each with fewer than 20 cases, and M all examiners combined.

It will be noted from this table that two examiners, C and E, had 217 (29%) of all the cases, but in only two (0.92%) of these did the fourth phase exceed 6 mm., while examiner H found this phase from 2-6 mm. in but 10.3% and over 10 mm. in 27.6% of his cases.

200 Twenty-Ninth Annual Meeting

TABLE II
LENGTHS OF 4TH PHASE OVER 10 mm. BY EXAMINERS

EXR.	11	12	13	14	15	16	17	18	19	20	21	22	23	24	ALL
A						1		2							3
B															0
C					1										1
D															0
E															0
F		2	2	1											5
G															0
H		4	1	2				1							8
I	1	10	2	2	1	3		1				1		1	20
J															
K															
A-K	1	16	3	6	1	4		4				1		1	37

The differences are further indicated by Table II, in which the most marked variations are recorded, and also by the following tabulation which shows that the fourth phase was reported.

Over	8 mm.	by	24	Examiners	in	97	(13.0%)	Cases
"	10	"	11	"	"	37	(5.0%)	"
"	12	"	8	"	"	10	(2.5%)	"
"	14	"	5	"	"	10	(1.3%)	"
"	16	"	3	"	"	6	(0.8%)	"
"	18	"	2	"	"	2	(0.3%)	"

Such variations are believed too great to be accounted for by an insufficient number of records, and, notwithstanding the small number, demonstrate, very definitely, marked differences at either one or both of the points referred to above.

TABLE III
BY LENGTH OF 4TH PHASE

Mm. Hg.	Cases	Systolic	4TH POINT		5TH POINT		4TH Phase
			Diastolic	P. P.	Diastolic	P. P.	
3-6	565	124	86	38	81	43	5
7-8	84	124	87	37	79	45	8
9-10	60	123	84	38	74	48	10
11+	37	125	91	34	77	48	14
Combined	746	124	86	38	80	44	6

Turning now to which of these points is most affected; it will be seen from the above table that, on the average, the fourth point where this phase is over 10 mm. is 5 mm. higher and the fifth point 4 mm. lower than for the same points where the phase is but 2-6 mm. (Table III). This was suggestive but not conclusive, and Table IV was prepared from those cases in which the 4th phase was 15 mm. or over.

TABLE IV
4TH PHASE 15 mm. AND OVER

Age	Cases	Systolic	Diastolic	Sys.	4TH POINT		Diastolic	5TH POINT		Ph.
					Dias.	P. P.		Dias.	P. P.	
42	I	116	78				60			18
46	I	128	98				80			18
49	I	140	96				80			16
38	I	118	88				70			18
33	I	135	100				78			22
34	I	134	105				90			15
32	I	126	110				85			24
34	I	125	100				84			16
33	I	124	88				72			16
38	I	122	94				78			16
41	I	140	118				100			18
	II	1408	1075	128	98	30	878	80	48	18

In this the fourth point is found to be 12 mm. higher and the fifth 1 mm. lower than for the same points with the phase 2-6 mm. (Table III). The pulse pressure was then 8 mm. smaller at the fourth and 5 mm. greater at the fifth point than is shown for the same points with the phase 2-6 mm. (Table III). The average systolic pressure is 4 mm. higher in this table than in Table III (phase 2-6 mm.). As the height of the diastolic normally bears some relation to that of the systolic, the latter may have an effect on the higher fourth point, yet, as the systolic in Table III was but 1 mm. higher, and the fourth point 5 mm. higher, and in this Table (IV) the systolic 4 mm. higher and the fourth point 12 mm. higher, some cause

202 Twenty-Ninth Annual Meeting

other than the systolic must be operative, particularly as the 5th point was not so much affected. The readings at the 5th point have, with few exceptions, been nearer the general average for this point. This cannot be said of those at the fourth point. Age is certainly not a factor (Table IV). Ability to concentrate on the procedure and acuteness of hearing no doubt have a distinct bearing, resulting in differences of interpretation. Some examiners would, therefore, have more difficulty in interpretation than others, and this would no doubt be experienced to a greater extent at the fourth than at the fifth point, for determination of the point of change in tone must be regarded as more difficult than is that of the loss of all sound.

It seems hardly possible that groups of applicants have normally such variations in their readings as are shown in Table I. Here examiners C and E together had four times as many cases as examiners F and H, but had only two reports showing a phase of over 6 mm., whereas the reports of F and H present very marked differences.

Owing to our confidence in the ability and judgment of the examiners involved in this analysis, and believing them competent to submit readings above the average in accuracy, we feel the variations above noted have largely resulted from differences in individual interpretations and that the fourth point is shown to be more liable to incorrect estimation than is the fifth.

The fifth point then appeals to us as the one at which, for the sake of uniformity and accuracy, we should ask our examiners to take the diastolic reading. It may not be quite as correct from a technical standpoint, but seems more practical for our purposes, and, as in 95% of all the reports the phase did not exceed 10 and in 76% did not exceed 6 mm., we feel it is sufficiently accurate and its use not likely to interfere with careful and proper estimation of risks.

In closing, I wish to acknowledge my great obligation to Dr. L. F. MacKenzie, for most valuable assistance in collecting the material for this analysis.

Dr. Jaquith—The report of the Committee on Blood-Pressure will be presented later, and I think it will be better to leave the discussion of this paper until that time.

Balloting for the nomination of officers was next in order. Doctors Daley and Rowley were appointed tellers, and distributed the ballots.

The Secretary read a letter from Dr. A. B. Wright, in which he requested that his name be not placed in nomination as a candidate for office, in view of the fact that he was resigning as Medical Director of the Travelers' Insurance Company, his resignation to take effect in the spring of 1919.

The Treasurer's Report was read by Dr. A. S. Knight, and, after being duly audited by Dr. Eakins and Dr. Snow, was accepted and placed on file.

In presenting the report of the M. I. B. Committee, Dr. O. H. Rogers said:

Mr. Chairman, the M. I. B. Committee fearing that the members of the Association might be a little restless about the affairs of their respective companies, sent its report to each one of the companies as quickly as it was learned that the October meeting was not to take place, so that every one here present has seen the report, presumably, and it seems superfluous to read it at this time. Aside from the facts as contained in the report submitted there is nothing to report.

On motion, the report of the M. I. B. Committee was accepted with thanks and placed on file.

The Secretary then read the following report of the Committee on Blood-Pressure, by Dr. J. W. Fisher:

204 Twenty-Ninth Annual Meeting

REPORT OF COMMITTEE ON LOW BLOOD-PRESSURE

By J. W. FISHER, M. D.

Medical Director, Northwestern Mutual Life Insurance Company

Your blood-pressure committee (of one) begs leave to submit the following data:

MORTALITY RISKS ACCEPTED BY THE NORTHWESTERN MUTUAL LIFE INSURANCE COMPANY WITH SYSTOLIC BLOOD-PRESSURE BY PALPATORY METHOD, 105 MM. HG. AND UNDER TO ANNIVERSARY IN 1917 (M. A. TABLE)

ISSUES OF 1912 TO 1916 INCLUSIVE					ISSUES OF 1907 TO 1910 INCLUSIVE				
Ages at Entry	No.	Expected	Actual	Ratio %	Ages at Entry	No.	Expected	Actual	Ratio %
16 to 39 Incl.	833	7.27	5	68.8	40 to 60 Incl.	201	15.35	11	71.7

TOTAL ALL YEARS AND ALL AGES

Number	Expected	Actual	Ratio %
1034	22.62	16	70.7

In addition to the above, the Northwestern Mutual Life Insurance Company insured 166 persons, ages 40 to 60, during the years 1912-1917, whose blood-pressure ranged between 95 and 105 mm. hg.; pressure taken by the palpatory method. No deaths have occurred, to date, from any cause. Also, the company insured 302 persons during the year 1917, ages 16 to 39, blood-pressure, by the palpatory method, ranging from 90 to 105 mm. hg., with no deaths.

We have kept no record of the small number of cases declined with a low blood-pressure.

Your committee of one is also chairman of a committee on the diastolic pressure. The other members are Doctors Cook and MacKenzie. There has been no coöperation of the members of the committee in securing data, and it has been impossible for the chairman to obtain an expression from this Association as to along just what lines the investigation should be made; in fact, the Association, it seems, cannot agree as to just what point the diastolic reading should be recorded.

The Northwestern Mutual Life Insurance Company's instructions to its examiners require the diastolic pressure to be taken by the auscultatory method, and recorded at the end of the last loud tone heard at the end of the third or beginning of the fourth phase. A record is only kept of accepted risks, and then only where the examination is made by a well-known, competent examiner of the company, and also where the examination is made at the home office. A card record is kept of all cases where the diastolic pressure is 95 mm. or over, also cases where the pulse pressure is below 25 or above 60 mm. on the average. This record has been kept since 1915. We have a record of 720 cases with only 3 deaths. The expected mortality was not computed, owing to the short period of the cases under observation, and the further fact that only three deaths had occurred.

Your chairman would suggest that the present chairman's resignation be accepted, or that steps be taken by this Association to formulate rules along lines which will aid the committee in its investigation of the subject. If the Association is of the opinion that other points than the above should be considered, the committee should have the results of the suggestions of the Association, and above all, the coöperation of all the members of the Association in collecting the data. A card record should be kept by each company, containing all the data necessary, and such cards furnished your committee when sufficient time has elapsed to furnish reliable conclusions. In my opinion, the only reliable method of handling the subject is along the lines followed by your committee in securing the results of the systolic blood-pressure.

206 Twenty-Ninth Annual Meeting

Dr. Willard moved that the report of the Blood-Pressure Committee be accepted as read, and placed on file, and that the Association maintain a discreet silence regarding the suggestion of the Chairman that his resignation be accepted. Motion carried.

A discussion then followed, of President Jaquith's paper: "A Study of the Fourth Phase of the Diastolic Pressure."

DISCUSSION

Dr. Porter—Dr. Jaquith's conclusions are so closely in accord with the view which I have held for a long while, that we should use uniformly the fifth stage for our readings, that I trust the members of the Association may agree upon this course.

There is quite a difference in the readings, perhaps greater than that covered in some of Dr. Jaquith's observations. I have had my assistants make careful notations as to the percentage of cases in which the fourth stage was clearly discernible, and in about 60% of the cases it was impossible to define that point clearly. In many instances, quite a large number of the 60%, there was simply a gradual gradation of sound, without the sudden drop, making it absolutely impossible, scientifically and accurately, to determine the fourth stage. There is no question but that the readings taken at the fourth stage may more accurately represent the true diastolic reading, yet practically for our purposes, if we are going to have uniformity in the border-line cases of high and low blood-pressure, we should agree to adopt here at his meeting the fifth stage for our readings. We would then know in passing upon a border-line case where the reading was taken, and it would not be necessary to discount that feature of the report. I hope that this course may be followed.

Just another point in connection with accuracy in this direction. We have found the use of Bowles' sphygmometroscope

has very materially aided uniformity in results. If you will observe closely your Home Office workers in applying the stethoscope, you will find a very marked difference in their methods, and where there are four or five men examining you will see quite a difference in their findings, and a good deal of that may be accounted for in the cases where the sounds are markedly indistinct by the amount of pressure exerted by the examiner in the use of his stethoscope. With the sphygmometroscope you have a uniform pressure. True, it is considerably greater with fat or muscular persons than it would be with a thin subject having a very small arm, but at the same time it is uniform, and where you are having comparative work done by various examiners, that personal equation is eliminated. I believe, therefore, that if some such device to further uniformity of results were adopted generally, it would be of definite value.

Dr. Root—I can endorse Dr. Porter regarding the practicability of the use of the fifth stage, rather than the fourth. Four or five years ago, I began to ask our examiners, in taking the diastolic pressure, to use the fifth phase, because I found from personal experience that the fourth was uncertain; and the reports I have been getting from these men have been fairly good. There is no question whatever as to the value of the diastolic record. It is going to be far more important, as we develop this whole question, than the systolic, in giving us a fair indication by the pulse pressure of the condition of the heart muscle.

I think Dr. Jaquith has done good work in bringing this out, and personally, I should be glad to endorse a uniform scheme of instructions to examiners embodying that point, namely, systolic by palpation and diastolic at the fifth phase by auscultation.

Dr. Porter—May I make one more suggestion with regard to the term that we use in giving instruction to our examiners? If we say "the final disappearance of sound," the conscientious, earnest examiner is going to draw on his imagination to get the very last sound, and you are going to have a certain number of reports come in with absurdly low readings, even

208 Twenty-Ninth Annual Meeting

down into the 40's or 50's. If we use the term "prior to," rather than "final disappearance," I think it will be better. I make this suggestion because it has worked out admirably in my own experience. It is purely a psychological point, and yet I think it will accomplish just what I claim for it.

Dr. Jaquith—Dr. Fisher has sent in a report of the experience of his company on the subject of habits, which the Secretary will read.

The Secretary read the following report by Dr. J. W. Fisher.

MORTALITY EXPERIENCE OF THE NORTHWESTERN MUTUAL LIFE INSURANCE COMPANY WITH RESPECT TO HABITS IN THE USE OF ALCOHOLIC STIMULANTS.

The Medical Department, in 1900, devised the scheme of classification outlined below, all risks for insurance, as to their habits in the use of alcoholic stimulants, to be coded at the time of approval by the member of the medical staff who passed upon the application. This classification was applied to the risks insured between the years 1885-1900, with the results shown below. It should be understood that the classification was based upon the information received at the time the application was made and the policy issued; no account has been taken of any subsequent change in the insured's habits:

- A. TOTAL ABSTAINER.
- B. MODERATE USER OF EITHER MALT, VINOUS, OR SPIRITUOUS BEVERAGES. (Is to apply to one who does not drink daily or regularly, and does not exceed 3 glasses of beer or light ale, or 2 of strong ale or porter, or 4 glasses of light wine, or 2 glasses of spirituous liquors in any one day at the most.)
- C. A REGULAR BEER DRINKER. (One who uses 4 or more glasses at most in any one day, or admits a daily practice of 1 or more glasses, or a weekly habit of 5 or more

Report on Use of Alcoholic Stimulants 209

glasses. Include in "C" users of wine in moderation with the above stated amount of beer.)

- D. A REGULAR SPIRIT DRINKER. (One who drinks 3 or more glasses at most in any one day and uses daily or weekly. To include cases of 4 or more glasses in any one day at the most; also where admission is made to the use of all kinds, but not entitled to come under the head of Moderate User.)
- E. FORMER INTEMPERATE HABITS—REFORMED WITHOUT TREATMENT.
- F. THOSE WHO HAVE TAKEN TREATMENT FOR INEBRIETY.

Note 1.

It is assumed that users of stimulants almost invariably use one of the three beverages with more regularity than they do the other two, and should be placed under the head of the beverage most used in each case.

Note 2.

Users of wine only should be classed either with "B" or "D" as the case may be. (See Note 4.)

Note 3.

Anstie's Limit—the amount of alcohol ($1\frac{1}{2}$ oz. per day) which the liver can completely oxidize.

Note 4.

3 ounces of ardent spirits are equivalent to about $1\frac{1}{2}$ oz. of absolute alcohol.

4 wine glasses full of sherry or other strong wine equal $1\frac{1}{2}$ oz. of absolute alcohol.

1 pt. bottle of claret or champagne, or other light wine, equals $1\frac{1}{2}$ oz. of absolute alcohol.

3 tumblers full of strong ale or porter equal $1\frac{1}{2}$ oz. of absolute alcohol.

5 tumblers full of beer or light ale equal $1\frac{1}{2}$ oz. of absolute alcohol.

210 Twenty-Ninth Annual Meeting

Class E—We issued 2,298 policies during the years 1885-1908, inclusive, to applicants who gave a history of former intemperance, but who had reformed without treatment. These showed a mortality of 103.21% of the M. A. Table.

Class F—344 policies were issued, covering the same period, to persons who had taken treatment for the alcoholic habit, but who had been total abstainers for at least five years previous to the issuance of the policy. These showed a mortality of 121% by the M. A. Table.

In no case was an application for insurance approved, where we were led to believe that the applicant would consume alcoholic beverages daily in excess of Anstie's Limit, so it can be assumed there were few such cases in the classes under consideration.

HABITS COUNT 1885-1900

EXPOSED TO 1915

"A" (TOTAL ABSTAINERS)

Year	Policies	Expected	Deaths	Actual	Ratio Am. Ex.
1	168,756	\$3,609,350	714	\$1,563,700	43.32
2		3,058,843	688	1,531,600	50.07
3		2,970,027	695	1,454,300	48.97
4		2,862,096	708	1,483,600	51.84
5		2,808,243	645	1,489,600	53.04
6 etc.		44,281,484	12,272	29,469,800	66.55
Total		\$59,590,043	15,722	\$36,992,600	62.08

"B" (MODERATE USERS)

	Policies	Expected	Deaths	Actual	Ratio Am. Ex.
1	102,268	\$3,268,905	487	\$1,506,300	46.08
2		2,878,305	481	1,418,800	49.29
3		2,831,265	494	1,445,000	51.04
4		2,783,384	465	1,599,500	57.47
5		2,764,191	539	1,716,700	62.10
6 etc.		42,408,253	9,773	34,486,900	81.32
Total		\$56,934,303	12,239	\$42,173,200	74.07

Report on Use of Alcoholic Stimulants 211

HABITS COUNT 1885-1900—Continued

"C" (REGULAR BEER DRINKERS)

Year	Policies	Expected	Deaths	Actual	Ratio Am. Ex.
1	13,387	\$ 389,505	64	\$ 171,200	43.95
2		346,274	59	177,700	51.32
3		339,731	59	148,400	43.68
4		332,982	81	231,600	69.55
5		330,361	77	221,100	66.93
6 etc.		5,026,488	1,399	4,654,000	92.59
Total		\$6,765,341	1,739	\$5,604,000	82.83

"D" (REGULAR SPIRIT DRINKERS)

1	1,981	\$ 108,795	24	\$ 125,700	115.54
2		97,296	16	105,200	108.12
3		94,597	15	80,100	84.67
4		92,724	16	91,300	98.46
5		92,437	15	79,300	85.79
6 etc.		1,371,448	283	1,439,600	104.97
Total		\$1,857,297	369	\$1,921,200	103.44

TOTALS OF "A," "B," "C," & "D"

All Years	286,392	\$125,146,984	30,069	\$86,691,000	69.27
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212 Twenty-Ninth Annual Meeting

NORTHWESTERN MUTUAL LIFE INSURANCE COMPANY

MORTALITY EXPERIENCE 1885 to 1900, INCLUSIVE TO ANNIVERSARY IN 1915, BY AMOUNTS (AMERICAN EXPERIENCE)

HABITS "A"					HABITS "B"			
Ages	Expected	No. Deaths	Amount	Ratio %	Expected	No. Deaths	Amount	Ratio %
16-20	1,379,342	459	808,400	58.6	398,208	118	197,500	49.6
21-25	6,091,970	1,766	2,863,500	47.0	3,074,103	798	1,859,700	60.5
26-30	8,567,247	2,449	4,445,000	51.9	6,343,750	1,483	3,726,300	58.7
31-35	9,221,307	2,363	5,046,000	54.7	8,396,296	1,986	5,698,200	67.9
36-40	9,436,740	2,349	5,728,100	60.7	9,461,705	2,079	6,830,600	72.2
Total	34,696,606	9,386	18,891,000	54.4	27,674,064	6,464	18,312,300	66.2
41-45	8,051,463	2,043	5,314,100	66.0	8,930,062	1,882	7,223,400	80.9
46-50	6,981,293	1,766	5,287,000	75.7	8,397,815	1,567	6,599,500	78.5
51-55	5,038,738	1,296	3,654,700	72.5	6,282,215	1,245	5,497,300	87.5
56-60	3,937,926	942	3,008,700	76.4	4,422,201	882	3,627,100	82.0
61-65	736,348	213	751,700	102.1	1,104,200	171	808,700	73.2
Total	24,745,768	6,290	18,016,200	72.8	29,136,493	5,747	23,747,000	81.5
Grand Total	59,442,374	15,676	36,907,200	62.1	56,810,557	12,211	42,059,300	74.0

HABITS "C"					HABITS "D"			
Ages	Expected	No. Deaths	Amount	Ratio %	Expected	No. Deaths	Amount	Ratio %
16-20	43,160	22	37,500	86.9	1,306	1	3,000	219.7
21-25	376,869	121	246,300	65.3	29,262	2	5,000	17.1
26-30	916,292	260	694,600	75.8	81,178	19	62,000	76.4
31-35	1,167,422	318	831,400	71.2	232,110	47	184,800	79.6
36-40	1,255,865	289	847,800	67.6	256,699	64	271,900	105.9
Total	3,759,608	1,010	2,657,600	70.7	600,555	133	526,700	87.7
41-45	1,020,116	256	980,600	96.1	313,928	60	317,500	101.1
46-50	813,427	195	815,800	100.3	261,431	69	338,600	129.5
51-55	657,776	142	552,100	83.9	283,409	50	393,600	138.9
56-60	401,644	111	501,600	124.9	314,148	42	249,800	79.5
61-65	108,821	23	93,300	85.7	81,868	13	90,200	110.2
Total	3,001,784	723	2,943,400	98.1	1,254,784	234	1,389,700	110.7
Grand Total	6,761,392	1,737	5,601,000	82.8	1,855,339	367	1,916,400	103.3

Report on Use of Alcoholic Stimulants 213

NORTHWESTERN MUTUAL LIFE INSURANCE COMPANY

—Continued

Grand Total	Expected	No. Deaths	Amount	Ratio %
"A," "B," "C," "D"	124,869,662	29,991	86,483,900	69.3

PERCENTAGE BELOW (—) AND ABOVE (+) THE GENERAL MORTALITY
COVERING THE SAME PERIOD

Ages	"A" %	"B" %	"C" %	"D" %	General Average %
16-40	-10.1	+9.4	+16.9	+44.9	60.5
41-65	- 8.2	+2.8	+23.7	+39.6	79.3
Total	-10.4	+6.8	+19.5	+49.1	69.3

Dr. Rogers—Mr. President, This looks like a very valuable contribution, and it seems to confirm in a general way the experience of the Medico-Actuarial, and I should say ran quite closely along the lines of the Medico-Actuarial. It also reflects the quite rigid general selection of the Northwestern. Risks taken in a spirit of pretty broad selection would not produce as favorable results. I think it is very unfortunate that Dr. Fisher did not measure all of his results by a single table. It makes it rather difficult to interpret his findings.

The Secretary then read the following report by Dr. J. W. Fisher:

MORTALITY ON ACCEPTED RISKS INVOLVING
ALBUMINURIA AND GLYCOSURIA

In all of the cases recorded in Tables No. I and No. II, either the Northwestern or some other company in the interchange had reported a past history of albumin or glycosuria. In no case was a risk accepted where albumin or sugar was present at the date of the approval, nor in at least five recent samples, voided at different times of the day, and at least one afternoon sample was examined at the Home Office. In the last few years, in cases with a past history of glycosuria, we have required that the glucose test be administered (four ounces of glucose dissolved in six ounces of water, with the addition of a little lemon juice to render it more palatable); one sample to be examined three hours after the administration of the glucose and the second sample twenty-four hours after.

In both classes of cases it will be seen that the cases were divided into four groups, with the mortality given in each group, and the totals. These totals are to be compared with the average mortality of 80%, which is the general average mortality of the Northwestern, by the M. A. Table, covering a like period. It will be noted in the glycosuria cases, that the mortality has not been above the general average mortality of the company at either age below 40, or ages 40 to 60, while in the albumin group, the mortality was considerably above the general average mortality of the company at ages 40 to 60.

In all of the albumin cases accepted during the past ten years, much stress was laid on the blood-pressure readings. Those cases which showed an average blood-pressure of ten or more millimeters above the average for the age, were rejected, as were also cases where there had been a comparatively recent history of high blood-pressure.

In both classes of cases we endeavored to eliminate all cases where the applicant had undergone treatment for albuminuria or glycosuria, especially in the recent past.

Report on Albuminuria and Glycosuria 215

TABLE I

NORTHWESTERN MUTUAL LIFE INSURANCE COMPANY
MORTALITY ACCEPTED RISKS 1897-1916, INCLUSIVE WITH A PREVIOUS
HISTORY OF SUGAR IN URINE TO ANNIVERSARY IN 1917 (M. A.
TABLE)

SUGAR IN URINE LESS THAN ONE YEAR PRIOR TO ACCEPTANCE

AGES 16-39				AGES 40-60				TOTAL			
No.	Expected	Actual	%	No.	Expected	Actual	%	No.	Expected	Actual	%
179	8.41	6	71.4	130	14.39	11	76.4	309	22.80	17	74.6

SUGAR IN URINE ONE YEAR AND LESS THAN THREE YEARS PRIOR TO ACCEPTANCE

131	5.10	5	98.0	97	8.92	7	78.5	228	14.02	12	85.6
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SUGAR IN URINE THREE TO FIVE YEARS PRIOR TO ACCEPTANCE

143	7.31	4	54.7	76	8.42	2	23.8	219	15.73	6	38.1
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SUGAR IN URINE OVER FIVE YEARS PRIOR TO ACCEPTANCE

189	7.57	3	39.6	197	20.43	15	73.4	386	28.00	18	64.3
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TOTAL

No.	Expected	Actual	%	No.	Expected	Actual	%	No.	Expected	Actual	%
642	28.39	18	63.4	500	52.16	35	67.1	1142	80.55	53	65.8

TABLE II

NORTHWESTERN MUTUAL LIFE INSURANCE COMPANY
MORTALITY ACCEPTED RISKS 1897-1916 INCLUSIVE, WITH A PREVIOUS
HISTORY OF ALBUMIN IN URINE. MORTALITY TO
ANNIVERSARY 1917 (M. A. TABLE)

ALBUMIN IN URINE LESS THAN ONE YEAR PRIOR TO ACCEPTANCE

AGES 16-39				AGES 40-60				TOTALS			
No.	Exp.	Act.	%	No.	Exp.	Act.	%	No.	Exp.	Act.	%
517	16.58	10	60.31	127	11.61	13	111.97	644	28.19	23	81.59

216 Twenty-Ninth Annual Meeting

TABLE II—Continued

ALBUMIN IN URINE ONE YEAR AND LESS THAN THREE YEARS PRIOR TO ACCEPTANCE

AGES 16-39				AGES 40-60				TOTALS			
No.	Exp.	Act.	%	No.	Exp.	Act.	%	No.	Exp.	Act.	%
553	19.13	13	67.93	181	18.38	15	81.61	714	37.51	28	74.65

ALBUMIN IN URINE THREE TO FIVE YEARS INCLUSIVE PRIOR TO ACCEPTANCE

449	18.05	11	60.94	143	11.42	19	166.37	592	29.47	30	101.80
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ALBUMIN IN URINE OVER FIVE YEARS PRIOR TO ACCEPTANCE

846	30.96	23	74.29	356	31.13	33	106.01	1202	62.09	56	90.19
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TOTALS

2345	84.72	57	67.28	807	72.54	80	110.28	3152	157.26	137	87.12
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Dr. Jaquith—That concludes the general business, and we will now proceed to the discussion of the papers. I have arranged with a number of gentlemen to come to the meeting, prepared to discuss the various papers, but of course I want to have it understood that anyone who wishes to do so is at perfect liberty to join in the discussion, after I have called on the different members with whom I have arranged to discuss the papers.

Many men of wealth have been induced to insure their lives for large amounts, so that in the event of their death, administrators of their estates might have funds readily available with which to pay inheritance taxes and meet other necessary expenditures, without having to convert valuable securities into cash for that purpose.

Experience on Risks over \$50,000 217

The War has brought into prominence a number of new industries, out of which many, not formerly possessed of much of this world's goods, have made fortunes. I believe that, in recent months, all of our companies have been called upon to consider more applications for large amounts than formerly.

The presentation by Dr. Symonds of a paper on "The Mortality Experience of Risks Insured for \$50,000 and Upwards on One Application" is very opportune.

THE MORTALITY EXPERIENCE ON RISKS INSURED FOR \$50,000 AND UPWARDS ON ONE APPLICATION.

BY BRANDRETH SYMONDS, M.A., M.D.,

*Chief Medical Director, The Mutual Life Insurance Company
of N. Y.*

The following report is based on the mortality experience of the risks insured in the Mutual Life for \$50,000 and upwards on one application during the thirty-one years from 1885 to 1915 both inclusive, observed to the policy anniversary in 1916. The expected deaths and losses were based on the Medico-Actuarial Table. This experience relates to *men* only who were insured in the United States and Canada for \$50,000 and upwards on one application or on different applications but all within three months. No applicant is included whose total insurance aggregated \$50,000 but which was issued over a greater interval than three months. Cases issued for \$50,000 and subsequently reduced were taken throughout. Policies exchanged for reduced paid-ups or for extended term insurance were treated as terminated. The method of treatment with reference to age, duration, etc., was similar to that adopted by the Medico-Actuarial Mortality Investigation.

218 Twenty-Ninth Annual Meeting

These statistics are divided into three periods, the first period covering the years of issues of 1885 to 1895; the second from 1896 to 1905; and the third period from 1906 to 1915. They are further divided into three classes.

Class I—\$50,000 to \$100,000 inclusive.

Class II—over \$100,000 to \$250,000 inclusive.

Class III—over \$250,000.

The number and amount insured, the years of exposure, the number and amount terminated by death, and the number and amount existing at the close of the observation period in 1916 in each period and class are set forth in the following table, in which the average age at issue and the average duration are also given.

TABLE A
ISSUES OF 1885 TO 1895

Insured			Years of Exposure		Terminated by Death		Existing at Close of Observation		Ave. Age at Issue	Ave. Dur.
Class	No.	Amount	No.	Amount	No.	Amount	No.	Amount		
I	917	\$61,487,000	7,828	\$479,627,100	149	\$8,914,200	82	\$4,871,100	39.8	8.6
II	19	2,288,000	156	17,536,800	4	451,700	4	440,600	45.5	8.2
III	1	452,000	1	452,000	....	.....	...	.....	50.0	1.0
Total	937	64,227,000	7,985	497,615,900	153	9,365,900	86	5,311,700	40.0	8.6

ISSUES OF 1896 TO 1905

I	1,461	101,003,400	8,554	534,229,000	115	6,688,600	294	18,146,000	42.3	5.9
II	134	20,137,600	1,002	134,699,200	11	1,421,400	39	5,127,700	43.6	7.5
III	27	13,848,200	160	92,217,200	4	2,575,000	6	3,908,000	45.1	5.9
Total	1,622	134,989,200	9,716	761,145,400	130	10,685,000	339	27,181,700	42.5	6.0

ISSUES OF 1906 TO 1915

I	1,079	69,522,050	4,034	255,941,750	36	2,413,300	697	42,977,700	42.6	3.7
II	94	14,761,000	392	61,168,100	5	820,000	55	8,098,000	43.1	4.2
III	10	3,614,600	41	14,217,200	1	273,300	6	2,441,300	41.1	4.1
Total	1,183	87,897,650	4,467	331,327,050	42	3,506,600	758	53,517,000	42.6	3.8

Experience on Risks over \$50,000 219

TABLE A—Continued

ISSUES OF 1885 TO 1915

Insured			Years of Exposure		Terminated by Death		Existing at Close of Observation		Ave. Age at Issue	Ave. Dur.
Class	No	Amount	No.	Amount	No.	Amount	No.	Amount		
I	3,457	232,012,450	20,416	1,269,797,850	300	18,016,100	1,073	65,994,800	41.8	5.9
II	247	37,186,600	1,550	213,404,100	20	2,693,100	98	13,666,300	43.5	6.3
III	38	17,914,800	202	106,886,400	5	2,848,300	12	6,349,300	43.8	5.3
Total	3,742	287,113,850	22,168	1,590,088,350	325	23,557,500	1,183	86,010,400	42.0	5.9

The following table shows the relative mortality in each period and class both on applications and amounts.

TABLE B

\$50,000 AND UPWARDS ON ONE APPLICATION

ISSUES OF 1885-1895—EXPOSED TO 1916

ON APPLICATIONS					ON AMOUNTS				
Class	Expos.	DEATHS		Ratio	Exposures	DEATH-CLAIMS		Ratio	
		Act.	Expected			Actual	Expected		
I	7,828	149	128.599	115.9	\$479,627,100	\$8,914,200	\$7,784,879	115.0	
II	156	4	3.809	104.8	17,536,800	451,700	426,344	106.1	
III	1	...	.009	...	452,000	...	4,113	...	
Total	7,985	153	132.417	115.5	497,615,900	9,365,900	8,215,336	114.3	

ISSUES OF 1896-1905—EXPOSED TO 1916

I	8,554	113	114.811	100.2	534,229,000	6,688,600	6,086,508	95.6	
II	1,002	11	13.175	83.5	134,699,200	1,421,400	1,003,729	83.9	
III	160	4	1.741	229.6	92,217,200	2,375,000	896,268	288.4	
Total	9,716	130	129.727	100.2	761,145,400	10,685,000	9,576,505	111.1	

ISSUES OF 1906-1915—EXPOSED TO 1916

I	4,034	36	38.008	94.7	255,941,750	2,413,300	2,435,770	98.9	
II	392	5	3.778	132.5	61,168,100	820,000	626,306	131.2	
III	41	1	.271	369.0	14,217,200	273,300	90,131	303.4	
Total	4,467	42	42.057	100.0	331,327,050	3,506,600	3,152,607	111.2	

220 Twenty-Ninth Annual Meeting

TABLE B—Continued
ISSUES OF 1885-1915—EXPOSED TO 1916

ON APPLICATIONS					ON AMOUNTS				
Class	Expos.	DEATHS		Ratio	Exposures	DEATH-CLAIMS		Ratio	
		Act.	Expected			Actual	Expected		
I	20,416	300	281.418	106.8	1,269,797,850	18,016,100	17,207,157	104.7	
II	1,550	20	20.762	96.2	213,404,100	2,693,100	2,746,379	98.0	
III	202	5	2.021	247.5	106,886,400	2,848,300	990,512	287.7	
Total	22,168	325	304.201	106.9	1,590,088,350	23,557,500	20,944,048	112.6	
Deduct reinsurance					70,287,900	1,792,700	609,081	294.0	
Total					1,519,800,450	21,764,800	20,334,967	107.3	

Class I—\$50,000 to \$100,000—shows a gradual improvement in the mortality by policies at the different periods, the ratio being 116% for the first period, 100% for the second period, and 95% for the third period. There is also a marked improvement in the mortality by amounts in the second period, but not so in the third, the ratio being 115% for the first, 96% for the second, and 99% for the third period. Class II—over \$100,000 to \$250,000—shows a marked improvement in the mortality by policies and amounts in the second period, from 105% by numbers and 106% by amounts in the first period, to 84% by numbers and amounts in the second period; it rises again in the third period to 133% by numbers and 131% by amounts. There was but one policy issued in the first period belonging to class III—over \$250,000—which was lapsed at the end of the first year. In the second period there were four deaths, giving a mortality ratio of 230% by policies and 288% by amounts; and in the third period there was one death, causing a ratio of 369% by numbers and 303% by amounts. Combining the three periods, Class I shows 107% by policies and 105% by amounts; Class II, 96% by numbers and 98% by amounts, and Class III, 248% and 288% for numbers and amounts respectively.

In all the cases under Class III as well as in some cases

Experience on Risks over \$50,000 221

under Classes I and II the Mutual Life had reinsured in other companies sixty-two lives for \$12,041,600. Of these, eight terminated by death from which we recovered \$1,792,700 in claims. This reinsurance shows a very high mortality ratio of 316% by *lives* and 294% by amounts. After deducting this reinsurance from the grand total, the loss ratio is reduced from 112.6% to 107.3%.

A summary of the experience by ages at issue and by policy years is set forth in the following table.

TABLE C

CLASS I—\$50,000 TO \$100,000

SUMMARY BY AGES, ALL POLICY YEARS COMBINED

ISSUES OF 1885 TO 1895—EXPOSED TO 1916

ON APPLICATIONS				ON AMOUNTS				
Ages	Expos.	DEATHS		Ratio	Exposures	DEATH-CLAIMS		Ratio
		Act.	Expected			Actual	Expected	
15-19	...	...	4.689	191.7	\$58,650,400	\$575,000	\$300,337	191.5
20-29	905	9	19.007	152.5	136,821,800	2,036,700	1,095,786	185.7
30-39	2,341	29	48.853	104.6	188,305,900	2,740,100	3,015,555	90.7
40-49	3,030	51	41.718	108.0	82,350,700	2,743,300	2,554,066	107.5
50-59	1,321	45	14.332	104.7	13,498,300	819,100	813,235	100.0
60 & Ov.	231	15						
Total	7,828	149	128.599	115.9	479,627,100	8,914,200	7,784,879	115.0

ISSUES OF 1896 TO 1905—EXPOSED TO 1916

15-19	51	...	.235	....	4,415,000	.....	20,374	....
20-29	804	2	3.966	50.4	47,117,300	100,000	230,271	43.5
30-39	2,564	18	16.138	111.6	158,449,900	1,030,900	981,006	105.2
40-49	3,223	46	36.531	126.0	206,243,700	2,810,800	2,307,657	121.7
50-59	1,559	36	30.935	97.6	97,228,200	2,027,800	2,250,526	89.6
60 & Ov.	353	13	21.006	61.9	20,774,900	719,100	1,190,674	60.4
Total	8,554	115	114.811	100.2	534,229,000	6,688,600	6,986,508	95.6

ISSUES OF 1906 TO 1915—EXPOSED TO 1916

15-19	22	...	.089	....	1,450,000	.....	5,840	....
20-29	229	4	.990	404.0	14,755,000	270,000	63,657	423.0
30-39	1,248	7	6.309	110.6	75,308,000	460,000	378,941	121.4
40-49	1,638	10	13.295	75.2	107,400,650	771,000	878,402	87.9
50-59	792	14	13.364	104.9	49,863,100	862,300	844,559	101.8
60 & Ov.	105	1	3.961	25.3	7,165,000	50,000	264,371	19.0
Total	4,034	36	38.008	94.7	255,941,750	2,413,300	2,435,770	98.9

222 Twenty-Ninth Annual Meeting

TABLE C—Continued
ISSUES OF 1885 TO 1915—EXPOSED TO 1916

ON APPLICATIONS					ON AMOUNTS				
Ages	Expos.	DEATHS		Ratio	Exposures	DEATH-CLAIMS		Ratio	
		Act.	Expected			Actual	Expected		
15-19	73	...	324	....	5,865,000	...	26,214	....
20-29	1,938	15	9,645	156.0	120,522,700	945,000	594,265	158.8	✓
30-39	6,153	34	41,454	130.1	370,579,700	3,527,600	2,453,733	143.6	✓
40-49	7,891	107	98,679	108.1	501,950,250	6,321,900	6,201,614	101.8	
50-59	3,672	95	92,017	103.6	229,442,000	5,633,400	5,656,081	99.7	
60 & Ov.	689	29	39,299	73.7	41,438,200	1,588,200	2,273,280	70.0	✓
Total	20,416	300	281,418	106.8	1,269,797,850	18,016,100	17,207,157	104.7	✓

SUMMARY BY POLICY YEARS, ALL AGES COMBINED

ISSUES OF 1885 TO 1895—EXPOSED TO 1916

Policy Years								
1	917	4	5.563	72.0	61,487,000	253,800	369,489	68.8
2	623	3	5.305	55.8	39,657,100	200,000	339,045	58.8
3	533	8	5.281	151.2	33,131,600	502,700	345,975	154.3
4	460	10	4.903	204.0	28,019,700	577,500	295,822	192.2
5	425	9	4.743	189.9	25,766,200	495,000	286,666	192.5
1-5	2,958	34	25.855	131.2	188,061,600	2,029,000	1,617,597	125.4
6-10	1,815	26	25.361	102.4	109,916,100	1,715,700	1,528,866	112.2
11-15	1,451	32	28.449	112.6	86,527,000	1,933,200	1,694,112	114.1
16-20	1,138	37	30.556	121.0	67,476,000	2,191,300	1,807,570	121.2
21 & Ov.	466	20	18.378	108.8	27,646,400	1,045,000	1,136,734	92.0
1-31	7,828	149	128.599	115.9	479,627,100	8,914,200	7,784,879	115.0
6-31	4,870	115	102.744	112.0	291,565,500	6,885,200	6,167,282	111.5

ISSUES OF 1896 TO 1905—EXPOSED TO 1916

1	1,461	4	9.208	43.6	101,003,400	238,200	632,726	37.6
2	747	6	6.684	90.0	46,652,000	245,000	415,138	39.0
3	690	5	6.847	73.0	42,944,500	266,600	421,753	53.2
4	623	9	6.764	133.2	38,577,600	635,000	414,492	153.7
5	575	8	6.762	118.4	35,310,700	404,100	412,178	98.2
1-5	4,096	32	36.265	88.0	264,488,200	1,788,900	2,296,287	77.8
6-10	2,414	30	35.144	85.5	147,079,600	1,866,100	2,119,055	88.1
11-15	1,565	39	30.852	126.4	94,128,500	2,294,600	1,824,156	125.7
16-20	479	14	12.550	111.6	28,532,700	739,000	747,010	99.0
1-20	8,554	115	114.811	100.2	534,229,000	6,688,600	6,986,508	95.6
6-20	4,458	83	78.546	105.4	269,740,800	4,899,700	4,690,221	104.4

Experience on Risks over \$50,000 223

TABLE C.—Continued
ISSUES OF 1906 TO 1915—EXPOSED TO 1916

ON APPLICATIONS				ON AMOUNTS				
Policy Years	Expos.	DEATHS		Ratio	Exposures	DEATH-CLAIMS		Ratio
		Act.	Expected			Actual	Expected	
1	1,079	11	6.791	161.7	69,522,050	727,300	441,434	165.1
2	790	6	6.757	88.8	49,060,800	475,000	432,004	109.7
3	679	3	6.438	46.5	42,993,800	200,000	410,989	48.0
4	522	5	5.485	91.0	33,031,400	350,000	352,571	99.1
5	382	1	4.424	22.6	24,258,400	100,000	282,181	35.5
1-5	3,452	26	29.895	86.8	219,466,450	1,852,300	1,925,179	96.1
6-10	582	10	8.113	123.0	36,475,300	561,000	510,591	110.0
1-10	4,034	36	38.008	94.7	255,941,750	2,413,300	2,435,770	98.9

ISSUES OF 1885 TO 1915—EXPOSED TO 1916

1	3,457	19	21.562	88.0	232,012,450	1,219,300	1,443,649	84.5
2	2,160	15	18.806	79.8	135,969,900	920,000	1,186,787	77.5
3	1,902	16	18.566	86.2	119,069,900	969,300	1,164,717	83.2
4	1,605	24	17.152	139.9	90,628,700	1,562,500	1,062,885	147.0
5	1,382	18	15.929	113.0	85,335,300	999,100	981,025	101.9
1-5	10,506	92	92.015	100.3	672,016,250	5,679,200	5,839,063	97.0
6-10	4,811	66	68.618	96.4	293,471,000	4,142,800	4,158,512	99.4
11-15	3,016	71	59.301	120.0	180,655,500	4,227,800	3,518,268	130.1
16-20	1,617	51	43.106	118.3	96,008,700	2,930,300	2,554,580	114.9
21 & Ov.	466	20	18.378	108.8	27,646,400	1,045,000	1,136,734	92.0
1-31	20,416	300	281.418	106.8	1,269,797,850	18,016,100	17,207,157	104.7
6-31	9,910	208	189.403	109.8	597,781,600	12,345,900	11,368,094	108.6

A study of Class I by ages at issue shows that the improvement in mortality which has taken place at the different periods has not been uniform at all ages. In the age-group 20-29, the number of deaths is too small to justify any conclusion. Only in the age-groups 30-39 and 60 and over has the improvement been uniform. By amounts of insurance the percentage of losses shows a uniform improvement only in the age-group 60 and over. At the younger ages, the improvement observed in the second period is not continued in the third period. Combining all the three periods the percentages of deaths for the five age-groups, 15-29, 30-39, 40-49, 50-59, and 60 and over, are respectively 150%, 130%, 108%,

224 Twenty-Ninth Annual Meeting

104%, and 74%; and the percentages of losses for the same age-groups are respectively 152%, 144%, 102%, 100%, and 70%. This high mortality ratio for ages at entry under forty is seen in the first five policy years as well as in the later policy years. The good showing for ages 60 and over is doubtless due in part to the mortality table used. The qx for these older ages in the Medico-Actuarial Table seems too large for accurate analysis.

Coming to the experience by policy years, it is seen that in the first period—1885-1895—there is a low mortality in the first two policy years both by policies and amounts, the mortality ratio being 72% and 56% by policies and 69% and 59% by amounts for the first two policy years respectively. In the third policy year the ratio rises to 151% by policies and 154% by amounts, and in the fourth policy year it rises still higher to about 200%. After the fifth policy year the percentages come down but in no case is it less than 100% by policies and in only one case, 21 years and over, is the ratio less than 100% by amounts. In the second period—1896-1905—the first three policy years show a very favorable mortality both by number and by amount, and policy years 6-10 are likewise favorable; in policy years four and five and also above the eleventh, the mortality ratios are above 100%. In the third period—1906-1915—the first year mortality ratio is 162% by policies and 165% by amounts, but in policy years 2-5 combined the ratio is 65% by number and 76% by amount. In policy years 6-10 the mortality ratio rises to 123% by number and 110% by amount. For the three periods combined—1885-1915—the first three policy years show a favorable mortality by policies and amounts, but at the subsequent policy years the mortality fluctuates, being 127% by policies and 126% by amounts for policy years four and five combined. In policy years 6-10 it is 96% by policies and 99% by amounts, but it rises again in policy years 11-20 to 119% by policies and 118% by amounts. Above the twentieth year the actual deaths are 109% of the expected and the actual losses are 92% of the expected.

Experience on Risks over \$50,000 225

TABLE D

CLASS II—OVER \$100,000 AND INCLUDING \$250,000

SUMMARY BY AGES AT ISSUE, ALL POLICY YEARS COMBINED

ISSUES OF 1885-1895—EXPOSED TO 1916

ON APPLICATIONS					ON AMOUNTS			
Ages	Expos.	DEATHS		Ratio	Exposures	DEATH-CLAIMS		Ratio
		Act.	Expected			Actual	Expected	
20-29	2	..	.007	....	\$263,100	\$.....	\$921	....
30-39	26	..	.192	....	2,970,400	.....	21,399	....
40-49	57	1	.952	....	6,283,000	113,000	104,319	108.4
50-59	71	3	2.058	112.8	8,020,300	338,700	299,705	112.8
60 & Ov.	..	..	.....	.....	.....	.....	.....	.....
Total	156	4	3.809	104.8	17,536,800	451,700	426,344	106.1

ISSUES OF 1896-1905—EXPOSED TO 1916

20-29	64	..	.332	....	9,527,000	.....	48,464	....
30-39	304	1	1.967	50.8	42,458,100	30,600	271,497	11.3
40-49	389	5	4.163	120.0	49,387,700	658,300	506,404	130.3
50-59	224	5	5.189	96.5	31,226,600	732,500	717,334	101.8
60 & Ov.	21	..	1.524	....	2,099,800	.....	150,030	....
Total	1,002	11	13.175	83.5	134,699,200	1,421,400	1,693,729	83.9

ISSUES OF 1906-1915—EXPOSED TO 1916

20-29	23	..	.107	....	3,343,000	.....	15,119	....
30-39	118	2	.609	328.0	17,217,000	260,000	87,427	296.4
40-49	157	2	1.234	162.0	24,251,400	410,000	192,599	212.8
50-59	88	1	1.614	62.0	15,388,700	150,000	295,777	50.7
60 & Ov.	6	..	.214	....	968,000	.....	35,384	....
Total	392	5	3.778	132.5	61,168,100	820,000	626,306	131.2

ISSUES OF 1885-1915—EXPOSED TO 1916

20-29	89	..	.446	....	13,133,100	.....	64,504	....
30-39	448	3	2.768	108.3	62,645,500	290,600	380,323	76.4
40-49	603	8	6.340	125.6	79,922,100	1,181,300	803,322	147.1
50-59	383	9	9.461	95.4	54,635,600	1,221,200	1,312,816	93.1
60 & Ov.	27	..	1.738	....	3,067,800	.....	185,414	....
Total	1,550	20	20.762	96.2	213,404,100	2,693,100	2,746,379	98.0

226 Twenty-Ninth Annual Meeting

TABLE D—Continued

SUMMARY BY POLICY YEARS, ALL AGES COMBINED

ISSUES OF 1885-1895—EXPOSED TO 1916

ON APPLICATIONS					ON AMOUNTS				
Policy Years	Expos.	DEATHS		Ratio	Exposure	DEATH-CLAIMS		Ratio	
		Act.	Expected			Actual	Expected		
1	19	..	.130	....	2,288,000	.....	15,284	....
2	10	..	.111	....	1,118,300	.....	12,454	....
3	9	1	.116	862.0	1,005,300	113,000	12,877	876.9	
4	8	..	.115	....	892,300	.....	12,892	....
5	8	..	.125	....	892,300	.....	14,028	....
1-5	54	1	.597	168.0	6,196,200	113,000	67,535	167.2	✓
6-10	35	..	.746	....	3,896,500	.....	83,455	....
11-15	34	2	1.098	182.2	3,783,500	225,700	122,838	183.2	✓
16-20	23	1	.846	118.0	2,542,000	113,000	94,063	119.8	
21 & Ov.	10	..	.522	....	1,118,600	.....	58,453	....
1-31	156	4	3.809	104.8	17,536,800	451,700	426,344	106.1	
6-31	102	3	3.212	93.6	11,340,600	338,700	358,809	94.5	

ISSUES OF 1896-1905—EXPOSED TO 1916

1	134	2	.845	236.0	20,137,600	140,500	126,600	111.0	✓
2	92	1	.778	129.0	12,676,700	150,000	104,925	143.0	✓
3	87	2	.789	254.0	12,103,800	310,500	108,947	285.0	✓
4	76	..	.741	....	10,095,800	.....	95,974	....
5	71	2	.756	264.0	9,556,400	300,400	98,707	303.4	✓
1-5	460	7	3.909	179.2	64,570,300	901,400	535,153	168.6	
6-10	291	..	3.924	....	37,273,900	.....	487,116	....
11-15	191	4	3.553	112.8	24,765,700	520,000	442,077	117.5	
16-20	60	..	1.789	....	8,089,300	.....	229,383	....
1-20	1,002	11	13.175	83.5	134,699,200	1,421,400	1,693,729	83.9	
6-20	542	4	9.266	43.2	70,128,900	520,000	1,158,576	44.9	

ISSUES OF 1906-1915—EXPOSED TO 1916

1	94	..	.611	....	14,761,000	.....	97,564	....
2	81	1	.720	139.0	12,507,800	110,000	113,671	96.8	✓
3	66	1	.630	159.0	10,634,600	210,000	105,626	198.9	✓
4	48	..	.539	....	7,691,100	.....	92,394	....
5	39	1	.430	233.0	5,971,600	150,000	71,638	210.0	✓
1-5	328	3	2.930	102.3	51,566,100	470,000	480,893	97.8	
6 & Ov.	64	2	.848	236.0	9,602,000	350,000	145,413	240.8	✓
1-10	392	5	3.778	132.5	61,168,100	820,000	626,306	131.2	✓

Experience on Risks over \$50,000 227

TABLE D—Continued
ISSUES OF 1885-1915—EXPOSED TO 1916

ON APPLICATIONS					ON AMOUNTS				
Policy Years	Expos.	DEATHS		Ratio	Exposures	DEATH-CLAIMS		Ratio	
		Act.	Expected			Actual	Expected		
1	247	2	1.586	126.2	37,186,600	140,500	239,448	58.7	
2	183	2	1.600	124.4	26,302,800	200,000	231,050	112.6	
3	162	4	1.535	260.4	23,743,700	633,500	227,450	279.4	
4	132	..	1.395	....	18,679,200	.....	201,260	....
5	118	3	1.311	228.9	16,420,300	450,400	184,373	244.1	
1-5	842	11	7.436	147.4	122,332,600	1,484,400	1,083,581	137.0 ✓	
6-10	390	2	5.518	36.2	50,772,400	350,000	715,984	49.0	
11-15	225	6	4.651	129.0	28,549,200	745,700	564,913	132.0	
16-20	83	1	2.635	37.9	10,631,300	113,000	323,446	35.0	
21 & Ov.	10	..	.522	....	1,118,600	.....	58,453	....
1-31	1,550	20	20.762	96.2	213,404,100	2,693,100	2,746,379	98.0	
6-31	708	9	13.326	67.5	91,071,500	1,208,700	1,662,798	72.6	

The numbers in these three groups of Class II are too small to admit of any extended analysis. It may be said though that selection seems to have been better in Class II than in Class I.

TABLE E
CLASS III—OVER \$250,000
SUMMARY BY AGES AT ISSUE ALL POLICY YEARS COMBINED
ISSUES OF 1896-1905—EXPOSED TO 1916

ON APPLICATIONS					ON AMOUNTS				
Ages	Expos.	DEATHS		Ratio	Exposures	DEATH-CLAIMS		Ratio	
		Act.	Expected			Actual	Expected		
20-29	....	..	....	....	.....	.....	.....	.....
30-39	57	1	.401	249.0	\$34,281,200	\$1,000,000	\$257,908	388.0 ✓	
40-49	82	..	.933	....	49,236,000	.....	504,313	....
50-59	16	3	.252	....	7,200,000	1,575,000	87,697	....
60 & Ov.	5	..	.155	....	1,500,000	.....	46,350	....
Total	160	4	1.741	229.6	92,217,200	2,575,000	896,268	288.4 ✓	

228 Twenty-Ninth Annual Meeting

TABLE E—Continued

ISSUES OF 1906-1915—EXPOSED TO 1916

ON APPLICATIONS					ON AMOUNTS				
Ages	Expos.	DEATHS		Ratio	Exposures	DEATH-CLAIMS		Ratio	
		Act.	Expected			Actual	Expected		
20-29	4	..	.018	.....	1,600,000	.....	6,840	.....
30-39	10	..	.050	.....	4,223,900	.....	20,885	.....
40-49	26	..	.194	.....	8,120,000	.....	50,010	.....
50-59	1	1	.009	11100.0	273,300	273,300	2,487	10986.7	
60 & Ov.	.....	..	.....	.....	.....	.....	.....	.....
Total	41	1	.271	369.0	14,217,200	273,300	90,131	303.4	✓

ISSUES OF 1896-1915—EXPOSED TO 1916

20-29	4	..	.018	.....	1,600,000	.....	6,840	.....
30-39	67	1	.451	222.0	38,505,100	1,000,000	278,793	358.0	
40-49	108	..	1.127	.....	57,356,000	.....	564,232	.....
50-59	18	4	.270	1480.0	7,925,300	1,848,300	94,297	1959.2	
60 & Ov.	5	..	.155	.....	1,500,000	.....	46,350	.....
Total	202	5	2.021	247.5	106,886,400	2,848,300	990,512	287.7	✓
Deduct reinsurance					70,287,900	1,792,700	609,081	294.0	✓
Total					36,598,500	1,055,600	381,431	276.6	✓

SUMMARY BY POLICY YEARS, ALL AGES COMBINED

ISSUES OF 1896-1905—EXPOSED TO 1916

Policy Years									
1	27	1	.176	568.0	13,848,200	500,000	88,812	565.0	✓
2	15	1	.144	694.0	8,613,000	1,000,000	75,099	1330.0	✓
3	14	..	.144	.....	7,613,000	.....	68,523	.....
4	12	..	.136	.....	6,383,000	.....	56,974	.....
5	12	..	.147	.....	6,383,000	.....	61,094	.....
1-5	80	2	.747	268.0	42,840,200	1,500,000	350,502	427.5	✓
6-10	45	1	.505	198.0	27,265,000	75,000	261,559	28.7	
11-15	28	..	.369	.....	17,968,000	.....	220,898	.....
16-20	7	1	.120	833.0	4,144,000	1,000,000	63,309	1580.0	✓
1-20	160	4	1.741	229.6	92,217,200	2,575,000	896,268	288.4	✓
6-20	80	2	.994	202.0	49,377,000	1,075,000	545,766	19.76	

Experience on Risks over \$50,000 229

TABLE E—Continued

ISSUES OF 1906-1915—EXPOSED TO 1916

1	10	1	.049	2040.0	3,614,600	273,300	17,292	1579.7
2	9	..	.056	.....	3,091,300	.....	18,345	.....
3	8	..	.052	.....	2,916,300	.....	18,271	.....
4	6	..	.044	.....	2,275,000	.....	15,913	.....
5	4	..	.035	.....	1,160,000	.....	10,270	.....
1-5	37	1	.236	424.0	13,057,200	273,300	80,091	341.6 ✓
6 & Ov.	4	..	.035	.....	1,160,000	.....	10,040 ✓
1-10	41	1	.271	369.0	14,217,200	273,300	90,131	303.4 ✓

ISSUES OF 1896-1915—EXPOSED TO 1916

1	38	2	.234	854.0	17,914,800	773,300	110,217	791.4 ✓
2	24	1	.200	500.0	11,704,300	1,000,000	93,444	1070.0 ✓
3	22	..	.196	.....	10,529,300	.....	86,794 ✓
4	18	..	.180	.....	8,658,000	.....	72,887 ✓
5	16	..	.182	.....	7,543,000	.....	71,364 ✓
1-5	118	3	.092	303.0	56,349,400	1,773,300	434,706	407.9 ✓
6-10	49	1	.540	185.0	28,425,000	75,000	271,599	27.6 ✓
11-15	28	..	.369	.....	17,968,000	.....	220,898 ✓
16-20	7	1	.120	833.0	4,144,000	1,000,000	63,309	1380.0 ✓
21 & Ov.	...	..	.....	.....	.....	.....	.....	..... ✓
1-31	202	5	2.021	247.5	106,886,400	2,848,300	990,512	287.7 ✓
6-31	84	2	1.029	194.4	50,537,000	1,075,000	555,806	193.5 ✓
Deduct reinsurance					70,287,900	1,792,700	609,081	294.0 ✓
Total					36,598,500	1,055,600	381,431	276.6 ✓

In Class III also the data are too few to justify any analysis. As there were no risks issued for an amount above \$250,000 before 1896 the observation extends only to two periods, 1896-1905 and 1906-1915. The selection seems to have been distinctly against the Company in both periods. It seems appropriate to insert here the remark that we too have suffered by reinsuring risks from other companies in the United States to the extent of 186% of the expected to the actual losses.

The causes of death and the ratio per 10,000 exposures among the large risks are set forth in the following table, together with the ratio per 10,000 exposures in the general experience of the Company among men insured in the United States and Canada.

TABLE F

DEATHS BY CAUSE AMONG MEN INSURED FOR \$50,000 AND UPWARDS ON ONE APPLICATION, WITH THE RATIO PER 10,000 EXPOSURES Issues of 1885-1915—Exposed to 1916									GENERAL EXPERIENCE Issues of 1885-1914 exposed to 1915			
Number terminated by Death					Ratio per 10,000 Exposures				Ratio per 10,000 Exposures			
CAUSE OF DEATH	Ages at Entry				Ages at Entry				Ages at Entry			
	All Ages	15 to 29	30 to 44	45 & Ov.	All Ages	15 to 29	30 to 44	45 & Ov.	All Ages	15 to 29	30 to 44	45 & Ov.
Typhoid fever	4	1	2	1	1.8	4.8	1.8	1.2	4.1	5.0	3.5	3.1
Malarial fever	...	...	...	...	...	...	...	...	.8	.5	.9	1.6
Influenza	2	...	...	2	.9	...	...	2.3	1.0	.4	.9	3.2
General Diseases A.	8	1	2	5	3.6	4.8	1.8	5.8	6.9	6.6	6.3	10.2
Tuberculosis	15	4	6	5	6.8	19.0	5.3	5.8	9.1	10.9	7.9	7.7
Cancer	23	...	7	10	10.4	...	6.2	18.4	4.3	1.1	4.3	16.1
Diabetes	5	...	2	3	2.3	...	1.8	3.5	1.4	.6	1.4	3.8
Alcoholism	1	...	...	1	.5	...	...	1.2	.5	.4	.6	.6
General Diseases B.	52	5	18	29	23.5	23.8	15.8	33.4	17.5	14.3	16.6	32.9
Apoplexy, Paralysis and Soft. of the Brain	34	...	13	21	15.4	...	11.4	24.2	6.9	1.3	6.2	29.3
General Paresis of Insane & Insanity	5	1	3	1	2.3	4.8	2.6	1.2	1.4	.7	1.6	2.6
Total Nervous Dis.	49	1	19	29	22.1	4.8	16.7	33.4	10.7	3.7	10.4	36.5
Heart Disease	23	1	6	16	10.4	4.8	5.3	18.4	6.6	1.6	5.7	27.7
Angina Pectoris	12	...	2	10	5.4	...	1.8	11.5	1.3	.1	.9	5.4
Arterio-Sclerosis	15	...	2	13	6.8	...	1.8	15.0	.7	.1	.4	2.8
Total Circulatory Dis.	57	1	13	43	25.8	4.8	11.4	49.9	10.3	2.4	9.0	43.1
Pneumonia	26	2	9	15	11.8	9.5	7.9	17.3	6.3	3.3	6.4	16.9
Total Respiratory Dis.	33	2	13	18	14.9	9.5	11.4	20.7	7.8	3.8	7.7	22.0
Diseases of Liver & Gall Bladder	9	1	1	7	4.1	4.8	.9	8.1	2.3	.7	2.3	6.9
Appendicitis & Peritonitis	11	...	6	5	5.0	...	5.3	5.8	2.5	2.4	2.5	3.1
Total Digestive Dis.	29	1	12	16	13.1	4.8	10.6	18.4	7.4	4.2	7.1	18.5
Bright's Disease	41	1	16	24	18.5	4.8	14.1	27.6	6.4	2.0	6.5	21.3
Total Genito-Urinary Dis.	45	1	17	27	20.3	4.8	15.0	31.1	7.3	2.1	7.0	26.5
Suicide	19	1	6	12	8.6	4.8	5.3	13.8	2.7	1.8	3.1	4.3
Casualties	24	2	14	8	10.8	9.5	12.3	9.2	5.7	5.2	5.5	8.5
Total Deaths from all causes	325	15	118	192	146.9	71.4	103.8	220.8	78.8	45.5	75.6	210.1

Experience on Risks over \$50,000 231

Owing to the fact that the average age at entry among the large cases was 42.0 years, while in the general domestic experience of the Company it was 32.8 years, 9.2 years younger, a higher death rate among the large cases from degenerative diseases was expected. However, after allowing for this difference in the average age at entry, the large risks show fewer deaths from acute infectious diseases, especially typhoid fever. They also show a lower death rate from tuberculosis for ages above 29, but almost double for ages at issue under 30. Cancer is a little heavier at all ages and apoplexy, paralysis, and softening of the brain are greater in the age period 30-44 but less in the age period 45 and over. The death rate from heart disease is lower above age 29 among the large risks but notably higher from angina pectoris and arteriosclerosis. Pneumonia is somewhat higher among the large cases and Bright's disease and diseases of the genito-urinary apparatus are decidedly so. Suicide and casualties are also more prevalent at all ages.

In his actuarial essay "On the Effects of Selection," Emory McClintock—than whom there has never been a more capable actuary—says: "It has been remarked that entrance-selection comprises three classes of agencies: the interested intrusion of unsound lives, the efforts made by the office to resist such intrusion, and the appeals made to different classes of proposers by the offices and their agents."

In the study of applicants for large amounts the intrusions may be divided into several varieties.

A.—Risks who are sound physically but bad financially. This class includes those who take out very large amounts of insurance with the definite idea of terminating life before the next premium comes due.

A company tries to prevent these risks (1) by excluding applicants for large amounts from the cheap term insurance; (2) by insisting on full annual premiums for large policies; (3) by incorporating a suicide clause in the contract; (4) by rigid investigation of the finances. None of these is very satisfactory. The second is met by the risk giving a note to

the agent who is able to discount it at his bank. The third is satisfied by making the exitus appear accidental, thereby forcing the claim at the best to a trial by jury on a question of fact, and we all know the result in such a procedure. The fourth step, the investigation of the finances, is most difficult and often very unsatisfactory. The ordinary mercantile agencies base many of their reports upon information furnished by the risk himself. Banks and bankers are sometimes greatly influenced by notes which they may be carrying for the risk or his corporation. They may even give a clean financial bill of health in the very hope that the insurance may furnish the family with sufficient money to pay off their claim on the estate. A financial statement by the risk himself is of very little value unless it can be incorporated with the policy and made part of the contract. Tardiness and failure in paying "the butcher, the baker, and the candlestick maker" are very definite financial defects in an applicant for a large amount.

B.—Risks who are sound physically and whose finances are moderate but who take more insurance than they can really afford. He may take the excessive insurance because he has prospects of increased income in the future, and the immediate cheapness of the insurance appeals to him. The same precaution should be taken in this type of risk as in A. If he is disappointed in his prospects, there may be a temptation to resort to suicide when the second premium comes due. The usual suicide clause, covering a year, will tend to prevent this and the risk will either lapse his policy or by hard scratching pay his second premium. If his finances fail to improve after that, the temptation is always present when a premium comes due, to make secure the provision for his family which his imagination, hopes, and altruism had anticipated when he took out the insurance. He has been known to convert his policies into extended term insurance and then commit suicide shortly before the date of expiry. Intrusions of this class therefore may affect the mortality rate for some years after entrance while those of Class A ripen in the first policy year.

Experience on Risks over \$50,000 233

C.—Risks who are sound physically and financially but whose alcoholic habits are bad.

Theoretically we ought to reject risks for large amounts when the alcoholic habits are in doubt even more promptly than when the application is small. Practically I wonder if we do apply this rule rigidly. It is not difficult to get abundant testimony from people who never saw the applicant drunk or even drinking. The standard of alcoholic excess differs in different grades of society and in different social sets in the same grade. Furthermore every friend of the applicant will tend to minimize his alcoholic excesses, and if some unfriend reports that the habits are bad, the cry is raised that his report is prejudiced. The temptation to present this favorable testimony is greater, the larger the premium. A large volume of it tends to confuse the mind of any layman who reads the correspondence. Sometimes even a medical director is carried away by it, forgetting that an ounce of positive testimony is worth a ton of negative testimony in such a matter. In other cases it seems to be impossible to get an accurate idea of the alcoholic habits of a risk, even with the most careful inspection and investigation. This applies particularly to men of power and wealth who are determined that the public shall not know of their secret vice. When such a risk desires insurance, he usually seeks a large amount. It is not surprising that when the case becomes a death-claim, we are able to secure full and reliable information about alcoholic excesses, which had been entirely concealed. But postmortem information of this kind is rarely of much help to the Company.

In the Medico-Actuarial Mortality Investigation the habits as to alcoholics were divided into several classes. Of these, Class 18, "Steady Free Users of Alcohol," was by far the most numerous. In the Mutual Life this was defined so as to include anyone who stated in his application that he used alcohol daily or whose habits in the course of our investigation were shown to involve the daily use of alcohol. In other words these risks were men who at the time of examination

234 Twenty-Ninth Annual Meeting

drank daily but had never drunk to excess, so far as we could ascertain. If we got any history of ever drinking to excess, they were put in Class 17 instead of Class 18. Cases with such a history of excessive drinking only numbered 14 all told among the risks for large amounts, and the percentage of their frequency was very much lower than in the general experience of the Company.

The following table shows the experience of the Company in Class 18, "Steady Free Users of Alcohol," which as interpreted above means men who drink daily but never to excess.

TABLE G

DISTRIBUTION OF CLASS 18 AMONG THE GENERAL EXPERIENCE OF THE COMPANY AND AMONG RISKS FOR LARGE AMOUNTS WITH THE RATIO OF ACTUAL TO EXPECTED DEATHS AND LOSSES

	Percentage of Distribution		Ratio of Actual to Expected	
	Applications	Amounts	Applications	Amounts
Issues of 1885-1906 General Experience	6.0	9.1	120.9	....
" " 1907-1914 " "	7.4	10.3	86.0	71.0
Total 1885-1914 " "	6.4	9.4	116.4	....
Issues of 1885-1905 Large Risks	16.6	16.6	123.2	148.6
" " 1906-1915 " "	16.1	15.9	79.8	81.0
Total 1885-1915 " "	16.4	16.4	117.2	138.9

In both the early and recent periods the proportion of "Steady free users of Alcohol" is very much larger among the applicants for large amounts than in the general experience. In the recent period our investigation and inspection of all applicants, both for small and large amounts, has been much more thorough than in the early period. This accounts for the higher percentage as well as for the lower mortality in the recent period. The difference between the larger risks and the smaller risks in both periods is due in part to the fact that the large risks are more thoroughly investigated and

Experience on Risks over \$50,000 235

more accurate knowledge of alcoholic habits is thereby obtained. After making allowance for this there seems no doubt that the applicants for large amounts partake of alcohol more freely than the average of insured risks, though those who drink to excess are less frequent.

D.—Risks who are sound financially but who conceal a medical impairment either past or present. These constitute a large class in all grades of insurance, but it seems reasonable to suppose that they will be more abundant proportionately among applicants for large amounts. These risks are regularly men of intelligence and force but often their success in life has been obtained by the use of rather low ethical standards. They regard insurance as personally useless until some defect arises, which prevents their getting insurance because it will probably shorten life. Insurance then becomes desirable and their superior intelligence and finances enable them to put themselves temporarily in apparent sound physical condition better than the average applicant. This is an assumption not based upon any definite statistics but upon a very distinct impression. Now the impression may be very distinct solely because of the very large amounts involved when these risks were caught in flagrante delictu but the statements above given seem reasonable and give strength to the impression. All companies act upon this impression by requiring a more elaborate medical examination of risks for large amounts. Usually two examinations are made by different examiners, two specimens of urine are obtained on different days or at different hours, and the urine is analyzed with greater care both chemically and microscopically. A careful investigation and inspection by trained lay inspectors is usually obtained. If we are informed that other companies are working on the risk at the same time, we communicate with them to ascertain if they have discovered any impairment. This sometimes secures valuable information. All these measures weed out a certain number of undesirables in this group. Unfortunately if an impairment is uncovered, this type of applicant will seek in every way to

minimize its importance or even cover it up again. He has the ability and the means, and knows often just how close he can shave the margin of the law. The stimulus of a large commission leads the agent to assist the applicant in this course. Doubtless some of these cases bluff their way through to the issuance of a policy even after partial knowledge of some impairment has developed. Companies which issue substandard policies have somewhat the advantage in this class, though I imagine they are sometimes very hard pressed to change the rating of a risk of this type.

On analyzing these various classes of Medical Impairments as defined by the Medico-Actuarial Committee, we found that the applicants for large amounts had a somewhat large proportion who showed impairments, 49.9% as compared with 32.1% in the general experience of the Company.

The number of risks in the individual classes of Medical Impairments was too small to admit of any analysis. For example all the abnormal ingredients of the urine only furnished 142 cases, covering all periods of time at and prior to examination. Altogether these showed 9 actual deaths and 7.05 expected, a mortality ratio of 127.8%. A history of hepatic colic was quite infrequent but renal colic was rather common, 24 cases in the earlier period and 13 in the recent period, about 1% of the entrants in each period and five times as frequent as the general experience of the Company. Thirty-nine risks showed large abdomen in the earlier period but only 3 in the recent period. Hernias were just about as frequent in the large risks as in the general experience of the Company. A history of appendicitis without operation was less common among the large risks but the appendectomies were more than twice as frequent. In the period since 1905 forty-six of our large risks had had the appendix removed, 3.9% as against 1.7% in the general experience of the Company in the same period.

It seems that the more careful examination and inspection of large risks bring to light a considerable number of impairments which are not ordinarily noted among the applicants

Experience on Risks over \$50,000 237

for smaller amounts. Furthermore when an applicant for a large amount has been disapproved, even temporarily, by one company, the tendency is to hustle him to another company in the endeavor to secure his prompt acceptance. Sometimes the other company issues insurance with a full knowledge of the findings of the first company which are then recorded as impairments. This happens to some extent with all disapproved applicants but the proportion is much larger when the application for is \$50,000 and upwards. We all know how much time we give daily to the constant review of such cases and to the reiterated appeals which are made for them.

E.—In the matter of weight the Mutual Life prior to 1903 accepted overweights quite freely but since then we have become more conservative. The following table shows the proportionate distribution among the different Build-groups as defined by the Medico-Actuarial Committee. These have been divided into age-groups for two periods of issue, 1885-1906, and 1907-1913. The ratio of actual to expected deaths has been inserted in parallel adjacent columns. The first half of the table refers to the general experience of men insured by the Company in the United States and Canada and in these sections the issues of 1885-1906 were exposed to 1915 and the issues of 1907-1913 were exposed to 1914. The latter half refers to risks issued for \$50,000 and upwards, the subject-matter of this paper. In these sections the periods of issue were 1885-1905, and 1906-1915, both exposed to 1916. You will see by this that the periods of issue and exposure are not identical but are near enough to make the comparisons fairly reliable. A word of caution should be said in regard to overweights. These regularly show a low mortality for the first five or ten years as compared with a total mortality for thirty years or more. We must make allowance for this, even if the mortality table used has a select qx for the first five years.

TABLE H

DISTRIBUTION OF ENTRANTS BY AGES AT ISSUE AND BY BUILD GROUPS AMONG THE GENERAL EXPERIENCE OF THE COMPANY AND AMONG RISKS FOR LARGE AMOUNTS, TOGETHER WITH THE RATIO OF ACTUAL TO EXPECTED, ACCORDING TO THE M. A. TABLE

ISSUES OF 1885-1906—EXPOSED TO 1916. GENERAL EXPERIENCE

ON APPLICATIONS

Ages at Entry	BUILD 8		BUILD 7		BUILD 6		BUILD 5		BUILD 4		BUILD 3		BUILD 2		BUILD 1		BUILD 0	
	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio
15-19	2.2	51	26.4	109	46.9	96	21.0	87	3.0	104	.4	97	.1	130	...	...	...	...
20-29	.3	132	13.9	114	42.2	95	31.7	87	8.8	93	2.4	102	.6	118	.1	178	.1	178
30-39	.2	118	9.2	103	32.2	97	32.8	93	15.9	104	6.9	124	2.2	150	.6	187	.6	187
40-49	.1	84	6.7	102	25.6	87	31.8	90	19.8	106	10.7	129	4.0	158	1.2	173	1.2	173
50-59	.2	64	6.2	91	22.4	84	30.5	91	21.4	104	12.5	116	5.0	133	1.7	150	1.7	150
60 & Ov.	.1	44	6.7	88	22.6	85	29.7	94	21.6	97	12.2	101	5.3	107	1.7	118	1.7	118
Total	.3	98	11.1	106	35.1	92	31.7	91	13.6	103	5.7	120	2.0	143	.5	165	.5	165

Ages ISSUES OF 1907-1913—EXPOSED TO 1914. GENERAL EXPERIENCE

Ages	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio
15-19	4.3	90	30.5	69	43.3	73	18.4	77	2.8	61	.6	101	.1	373	...	...	...	...
20-29	.5	95	14.0	78	41.4	67	30.9	65	9.2	63	2.7	63	.6	64	.1	107	.1	107
30-39	.3	77	9.2	80	30.5	66	32.3	66	17.3	72	8.0	74	2.1	76	.3	80	.3	80
40-49	.2	140	6.2	75	23.3	79	31.1	72	22.0	69	12.9	65	3.6	98	.7	70	.7	70
50-59	.1	278	5.6	96	20.5	65	30.1	76	24.1	89	14.7	83	4.2	89	.7	42	.7	42
60 & Ov.	.3	...	5.9	59	20.7	61	31.3	86	25.3	57	12.6	75	3.6	34	.3	...	.3	...
Total	.6	99	11.0	78	33.5	68	30.5	71	14.6	72	6.8	73	1.8	83	.3	63	.3	63

Ages ISSUES OF 1885-1905—EXPOSED TO 1916. LARGE RISKS

Ages	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio
15-19	...	...	20.0	...	60.0	...	20.0	...	...	...	...	...	...	...	...	...	...	...
20-29	...	...	10.7	320	35.7	60	30.4	183	14.4	112	7.2	...	1.1	...	.4	...	.4	...
30-39	...	...	8.0	282	25.4	108	27.3	120	22.1	90	11.7	155	4.0	119	1.3	...	1.3	...
40-49	.1	...	4.2	83	15.8	100	26.0	97	26.8	126	17.3	113	7.7	139	1.9	201	1.9	201
50-59	.5	...	2.0	59	10.8	96	22.8	91	28.3	100	23.7	110	9.0	109	2.9	183	2.9	183
60 & Ov.	...	...	4.0	90	10.7	120	22.7	71	28.0	64	21.3	81	9.3	100	4.0	...	4.0	...
Total	.2	...	5.8	143	20.0	99	26.2	99	24.3	107	15.6	113	6.1	115	1.8	129	1.8	129

Ages ISSUES OF 1906-1915—EXPOSED TO 1916. LARGE RISKS

Ages	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio	Distribution	Mort. Ratio
15-19	...	...	14.3	...	14.3	...	42.9	...	28.6	...	...	...	...	...	...	...	...	...
20-29	...	...	18.7	...	34.7	368	22.7	386	14.6	676	6.7	...	1.3	...	1.3	...	1.3	...
30-39	.8	...	5.1	...	34.2	136	32.5	129	25.0	172	9.3	147	2.7	...	.5	...	.5	...
40-49	...	...	4.1	138	14.0	107	27.2	...	28.2	110	16.9	45	7.4	180	2.3	...	2.3	...
50-59	.5	...	3.2	...	8.2	168	28.8	48	27.0	195	20.6	98	9.1	82	2.7	...	2.7	...
60 & Ov.	...	...	...	...	3.8	...	19.3	...	57.7	38	15.4	...	3.8	...	...	...	...	...
Total	.3	...	5.1	57	17.7	185	28.8	51	26.7	140	14.4	75	5.7	107	1.7	...	1.7	...

Experience on Risks over \$50,000 239

In both periods the large risks show much higher proportion of entrants in those Build-groups which are above the average weight, Build-groups 1, 2, 3, and 4. This holds true for the younger ages, 20-29, as well as for the older ages. On the other hand Build-groups 2, 3, and 4 show a decidedly smaller mortality among the large risks of the earlier period than in the general experience of that time, and this is true at practically all ages. In the recent period the mortality ratios of Build-groups 1, 2, 3, and 4 is quite low in the general experience and also among the large risks, with the exception of Build-group 1. This is entirely to be expected for overweights show excellent results in the first five or ten years of exposure if the medical examinations have been thorough and exact. The deaths of this recent period come from 7 first-policy-years, 6 second-policy-years, 5 third-policy-years, 4 fourth-policy-years, 3 fifth-policy-years, 2 sixth-policy-years, and only 1 seventh-policy-years, that 1 being of the small issues of 1907. Furthermore the number of deaths among the large risks in the recent period is only 42, a very small number when divided into eight Build-groups. After making all these allowances it is fair to say that the selection among overweights in the recent period has not been poor, either in the general experience or among the large risks.

Risks for large amounts are plumper than in the general experience of the Company, but by the extra care in examination and in selection the mortalities have been kept down below what we would ordinarily expect. This is true even after thirty years of exposure. These fat ones do not become good risks but they are less bad than in the general experience of the Company.

The following table—Table J—shows certain causes of death for each of the Build-groups in the older period. It gives the actual number of deaths and the rate per 10,000 exposures and in an adjacent column the rate per 10,000 exposures for the corresponding cause among the entrants in the same Build-group in the general experience of the Company.

TABLE J

DEATHS BY CAUSE AND THE RATE PER 10,000 EXPOSURES FOR EACH OF
ISSUES OF 1885-1905-

	BUILD 7			BUILD 6			BUILD 5		
	Large Risks		General Experience	Large Risks		General Experience	Large Risks		General Experience
	Deaths	Rate per 10M		Deaths	Rate per 10M		Deaths	Rate per 10M	
Typhoid Fever.....			4.9			4.1	2	4.5	4.3
Malarial Fever.....			1.1			.9			.8
Influenza.....			1.3			.9			.9
General Disease A.....			8.5	1	2.9	7.0	2	4.5	6.9
Tuberculosis.....	2	19.7	19.3	3	8.8	12.9	2	4.5	7.1
Cancer.....	3	29.5	3.1	1	2.9	3.4	2	4.5	4.5
Diabetes.....			.6	1	2.9	.6			1.0
General Disease B.....	5	49.2	25.6	7	20.4	19.4	5	11.2	15.4
Apoplexy, Paralysis, and Softening of the Brain....	2	19.7	3.2	6	17.5	4.3	3	6.7	6.7
General Paresis of Insane....			.6	2	5.8	.9	2	4.5	1.0
Insanity.....			.5			.5			.6
Total Nervous Diseases....	2	19.7	6.8	9	26.3	8.1	10	22.3	10.8
Heart Disease.....			3.5	2	5.8	4.2	5	11.2	6.6
Angina Pectoris.....			.7	1	2.9	.9	2	4.5	1.5
Arteriosclerosis.....			.6	4	11.7	.7	3	6.7	1.1
Total Circulatory Diseases..			5.6	7	20.4	6.5	11	24.5	10.2
Pneumonia.....	2	19.7	7.4	3	8.8	6.2	6	13.4	6.1
Total Respiratory Diseases..	3	29.5	8.8	4	11.7	7.5	7	15.6	7.5
Diseases of Liver and Gall Bladder.....			1.4			1.5	3	6.7	2.1
Appendicitis and Peritonitis	2	19.7	1.9	1	2.9	2.1	1	2.2	2.5
Total Digestive Diseases....	4	39.3	5.7	1	2.9	5.9	7	15.6	7.2
Bright's Disease.....			3.5	4	11.7	3.9	5	11.2	5.8
Total Genito-Urinary Diseases.....			3.9	4	11.7	4.8	6	13.4	6.7
Suicides.....	2	19.7	2.8	2	5.8	2.5	6	13.4	2.7
Casualties.....	1	9.8	5.0	4	11.7	5.1	7	15.6	6.4
Total Deaths.....	18	176.9	74.8	39	113.9	69.3	64	142.7	76.5

Experience on Risks over \$50,000 241

TABLE J

THE BUILD GROUPS AMONG LARGE RISKS AND GENERAL EXPERIENCE
EXPOSED TO 1916

BUILD 1			BUILD 2			BUILD 3			BUILD 4		
Large Risks		General Experience	Large Risks		General Experience	Large Risks		General Experience	Large Risks		General Experience
Deaths	Rate per 10M	Rate per 10M	Deaths	Rate per 10M	Rate per 10M	Deaths	Rate per 10M	Rate per 10M	Deaths	Rate per 10M	Rate per 10M
		4.1			4.7			4.3			4.7
		.7			1.3			1.1			1.5
		1.1	1	3.8	1.3			1.8	1	26.5	2.5
1	2.2	7.2	1	3.8	8.5			9.2	1	26.5	10.3
4	8.8	3.6	2	7.7	2.6			2.2			2.7
1	2.2	6.5	6	23.0	8.4	4	35.1	7.9	1	26.5	10.1
3	6.6	2.3	1	3.8	4.8			9.9			11.3
10	22.1	15.6	11	42.1	19.7	4	35.1	24.8	2	53.0	29.0
6	13.3	12.1	6	23.0	18.7	4	35.1	25.9	1	26.5	33.5
1	2.2	1.4			1.2			1.7			2.2
		.7			.4			.3			.7
10	22.1	17.0	7	26.8	23.2	4	35.1	29.8	1	26.5	40.3
4	8.8	11.2	9	34.5	15.9			23.8	1	26.5	33.9
5	11.1	2.8	2	7.7	4.1	1	8.8	5.4			3.7
3	6.6	2.0	1	3.8	3.5	4	35.1	3.0			3.9
13	28.7	17.5	13	49.8	26.0	7	61.5	35.1	1	26.5	44.5
4	8.8	7.3	4	15.3	8.7	2	17.6	10.1	1	26.5	10.3
7	15.5	9.3	4	15.3	11.1	2	17.6	12.7	1	26.5	13.5
3	6.6	4.1	3	11.5	6.0			7.7			10.1
1	2.2	2.9	5	19.2	3.3			3.7	1	26.5	4.4
4	8.8	10.6	9	34.5	13.1			15.8	2	53.0	21.4
18	39.8	11.0	6	23.0	17.0	5	43.9	26.2	1	26.5	32.0
19	42.0	12.4	7	26.8	19.0	6	52.7	28.7	1	26.5	35.7
3	6.6	3.2			3.8			4.0	1	26.5	4.2
3	6.6	6.0	2	7.7	5.5			4.3			5.7
71	156.9	102.8	56	214.5	134.3	23	201.9	170.4	10	265.0	213.8

The light-weight groups, 6 and 7, show a high mortality in the early period. A careful study of the causes of death does not determine anything in Build-group 7. There are only two cases of tuberculosis, about the normal expectation. There were 3 deaths from cancer, but these occurred 9, 11, and 18 years after issue, so the light weight cannot be ascribed to a concealed cancer.

In Build-group 6 the deaths from tuberculosis only numbered 3 below the average. Unacknowledged syphilis was responsible for 3 deaths, one by the route of locomotor ataxia and the other two by way of general paresis, after durations of 7, 10, and 10 years. There was 1 death from diabetes, 6 from cerebral apoplexy, 2 from heart disease, 1 from angina pectoris, 4 from arteriosclerosis, and 4 from Bright's disease. These are all degenerative diseases and account for 46% of the deaths. This is much above the average, even if we make allowance for the older age at entry of the large risks. It is what we might expect in a group of marked overweights. The duration of all these cases was good, the shortest being seven years.

In fact, a careful study of this table shows that the degenerative diseases predominate. Even if we allow that the average age at entry for large risks was 42 years, degenerative diseases are much too numerous as a mode of exit. If we compare this table with Table F we see that this is true for all ages, and now it is found to be true for all build-groups.

F.—The very low mortality in the first policy year of the issues in Class I prior to 1906 requires explanation. The insurance business of this period was conducted under very different rules from those of the present time. The commissions were much larger and generally increased with the size of the application. Competition between the companies was very keen and not infrequently 90% or more of the first annual premium was paid to the agent who often rebated most of it to the applicant. These commissions became so excessive in November and December of each year, that our Company was accused of throwing in a sealskin overcoat with each \$100,000

Experience on Risks over \$50,000 243

policy, and in reproof valiant we said that the Equitable and New York Life threw in a brown stone front with each of their large policies. In neither case was any premium supposed to be paid by the applicant. In some cases the policies were never actually delivered to the policyholder but were held by the agent who reaped the sealskin overcoat or the brown stone front without cost. The hope of the Company, whether the policy was actually delivered or not, was that these policyholders would be induced to pay the second premium a year later, and then the third, and so on. But this hope was a miserable delusion as the following table shows.

TABLE K

CLASS I.—\$50,000 TO \$100,000 ON ONE APPLICATION

ISSUES OF 1885-1906

Policy Years	INSURED		LAPSED		Percentage of Lapses	
	Number	Amount	Number	Amount	Number	Amount
Jan. to Oct.	1,657	\$112,230,000	607	\$46,215,500	36.6	41.2
Nov. & Dec.	793	55,824,300	419	31,549,100	52.8	56.5
Total Pol. Yr. 1	2,450	\$168,054,300	1,026	\$77,764,600	41.9	46.3
" " " 2	1,416	89,734,200	143	10,102,200	10.1	11.2
" " " 3	1,264	79,187,000	135	9,322,800	10.7	11.7
" " " 4	1,117	69,134,100	64	4,368,100	5.7	6.3
" " " 5	1,034	63,553,500	52	3,597,300	5.0	5.6
" " " 1-5	7,281	\$469,663,100	1,420	\$105,155,000	19.5	22.4

I have divided the issues in this way for the conditions in November and December were regularly worse than in the rest of the year.

These applicants who lapsed their policies in the first year or at the end thereof were healthy and the actual mortality for the first policy year was therefore low.

The business however was effected at a substantial loss even if there had been no deaths at all in the first policy year. Perhaps some of them paid their premiums for the second and third years, and then took a reduced paid-up policy or

244 Twenty-Ninth Annual Meeting

extended-term insurance. This would account for the favorable mortality in the second and third policy years and the sharp increase thereafter. Most of them dropped their policies at the end of the first policy year and took out another large policy in another company at the same lack of cost to themselves. By the fourth or fifth year they would get back to us, their lapses would be forgiven and a large policy would again be issued with the same result if they were still sound at the end of the year. If the policyholder developed a serious impairment during the year he clung to his policy with great tenacity, especially if he was rejected by another company. In this way there was a continuous selection against the Company by these risks for large amounts. Since 1906 this business has been entirely stopped among the New York companies. Not only do the laws governing commissions practically forbid it but the companies themselves are wiser and thoroughly alert to the danger and uselessness of such methods. The effectiveness of these restraints is shown in the following table.

TABLE L

CLASS I.—\$50,000 TO \$100,000 ON ONE APPLICATION
NUMBER AND AMOUNT INSURED AND LAPSED WITH THE PERCENTAGE
ISSUES OF 1907 TO 1915—EXPOSED TO 1916

Policy Years	INSURED		LAPSED		Percentage of Lapses	
	Number	Amount	Number	Amount	Number	Amount
1	1,011	\$64,720,150	130	\$9,533,150	12.9	14.8
2	754	47,218,700	35	2,517,400	4.7	5.3
3	646	40,728,300	53	3,583,700	8.2	8.8
4	492	31,051,900	37	2,276,000	7.5	7.3
5	353	22,428,900	25	1,538,200	7.1	6.9
1-5	3,256	\$206,156,950	280	\$19,448,450	8.6	9.4

G.—As a result of our study, the following inferences may be drawn.

1. Applicants for large amounts regularly eat and drink more than the average and more than they ought to.

2. This class is more subject than the average to "the interested intrusion of unsound lives," whether this unsoundness be due to finances, health, or habits.

3. The most elaborate investigation will not always reveal the truth as to finances and habits, but the more rigid it is, the better is the result.

4. The most careful medical examination should be instituted to exclude the faintest beginnings of the degenerative diseases. Large risks are subject to these and die of them, even if they are young or lean.

5. Even with the utmost care in examination, investigation and selection, the large risks will not show as low mortalities as in the general experience of a first-class company among its standard lives, for they eat and drink too much.

DISCUSSION

Dr. Jaquith—I am sorry that Dr. Dwight is ill and not able to be with us, but the Secretary will read his discussion of Dr. Symonds's paper.

The Secretary then read the following discussion by Dr. Dwight:

Dr. Dwight—The members of this Association have learned by experience that any paper emanating from the Medical Department of the Mutual Life Insurance Company is worthy of serious consideration and when Dr. Symonds enters seriously upon the discussion of any important subject we can all be sure that whatever he does is well done and worth doing.

The subject which he has opened at this meeting is one which appeals to us all and which is of the greatest importance to the Companies which we represent. Not only is it important because it involves large amounts of insurance, but for the reason that there is no group of cases coming to the Medical Department for decision in which so much interest is taken by the Agents and the Executive Officers. Adverse decisions on small cases are usually accepted without serious question or

246 Twenty-Ninth Annual Meeting

criticism but when amounts appear which approach the limit of the Company everyone who sees the papers becomes interested. They are brought to our desks first and their subsequent progress is watched with solicitude by everyone from the local agent to the highest Executive Officer.

From another point of view they are important. Error in judgment or bad luck with a small case causes little disturbance and may be readily covered by the volume of our business, but when the amount approaches the Company's limit the future of the case is much more carefully watched and its effect upon the mortality is of greater importance. Mr. Henry Moir in his *Life Insurance Primer* used a term which was new to me. He speaks of "Cost of Assurance or Death Strain." I know that this term "Death Strain" is familiar to the Actuaries but it was new to me and I like it. The "Death Strain" of a policy for one hundred thousand dollars is just one hundred times as heavy as that for one thousand dollars. How much the strain is to a particular company will depend upon its size, age, and the character of the business of that company. The heavier it is, the greater the effect upon the mortality. Such being the fact a large policy for one company may be a small or normal one for another.

The facts presented in Dr. Symonds's paper are worthy of very serious study by us all and by all of the officers of each company connected with this Association. They should be impressed upon the Financial as well as upon the Agency Department and there is no one connected with the management of any of our companies who should not have clearly in mind the facts brought out. These facts do not materially change the situation which we all appreciate. So far as I know every investigation demonstrates that a relatively high mortality will be found in those groups of lives involving the larger amounts of insurance and even if we should find one or more companies that had succeeded in so selecting their larger risks as to be furnished with a relatively normal mortality, we should also find that the "Death Strain" involved had had its effect in showing an irregularity in the mortality curve which at least

required explanation. On an investigation of our own experience some of us may demonstrate slightly better results, but the majority, I think, will be surprised to learn that the mortality on their larger risks has been so great.

It so happens that our company has recently increased its limits, this action following an investigation of our own experience somewhat similar to but not as exhaustive as that with which Dr. Symonds has favored us.

Our results somewhat abbreviated were as follows:

POLICIES ISSUED—\$20,000 AND OVER

1875-1917

MORTALITY—BASED ON AMERICAN EXPERIENCE TABLE—ATTAINED AGES

\$20,000 and over (all cards)	Exposures	22,073	
	Cards	3,784	
	Deaths	247	
	Percentage		79.9%
\$20,000-\$30,000	Exposures	16,651	
	Cards	2,691	
	Deaths	195	
	Percentage		82.4%
\$30,000-\$40,000	Exposures	2,731	
	Cards	552	
	Deaths	33	
	Percentage		82.9%
\$40,000-\$50,000	Exposures	962	
	Cards	192	
	Deaths	4	
	Percentage		34.2%
\$50,000 and over	Exposures	1,763	
	Cards	349	
	Deaths	15	
	Percentage		62.8%
\$40,000-\$50,000			
Taken in one policy	Exposures	18	
	Cards	8	
	Deaths	0	
	Percentage		%
Taken in policies from 2 to 23 in number	Exposures	944	
	Cards	184	
	Deaths	4	
	Percentage		34.8%

248 Twenty-Ninth Annual Meeting

POLICIES ISSUED—\$20,000 AND OVER—Continued

1875-1917

\$50,000 AND OVER

Taken in one policy	Exposures	540	
	Cards	121	
	Deaths	6	
	Percentage		98.4%
Taken in policies from 2 to 13 in number	Exposures	1,205	
	Cards	228	
	Deaths	9	
	Percentage		59.2%

\$40,000 AND OVER

Taken in one policy	Exposures	558	
	Cards	129	
	Deaths	6	
	Percentage		93.8%
Taken in policies from 2 to 23 in number	Exposures	2,149	
	Cards	412	
	Deaths	13	
	Percentage		48.5%

MORTALITY—BASED ON MEDICO-ACTUARIAL TABLE—AGES AT ENTRY

AGES AT ENTRY

	Under 45	Over 45
\$20,000 and over (all cards)	105.2%	109.4%
\$20,000-\$30,000	106.1	113.6
\$30,000-\$40,000	104.1	112.9
\$40,000-\$50,000	62.8	29.9
\$50,000 and over	127.3	76.1

They required very little explanation, but there are two or three points to which I would call your attention.

We found, as did Dr. Symonds, that the mortality of our larger cases was somewhat higher than that which we experienced in our average groups. The exposures in some of our groups are small but the trend is, I believe, a definite one and from it we learned again the value of over-selection. We had been in the habit of limiting some of our forty and fifty thousand dollar applications to twenty-five or thirty thousand and it will be noticed that as a result of this over-selection the mortality on amounts over forty thousand dollars was distinctly better than for amounts between twenty and forty thousand

dollars. It also appears that on large amounts taken in one policy the mortality was distinctly greater than where the total amount at risk had gradually accumulated by the taking of a number of policies.

Our experience agrees with Dr. Symonds, that the excess mortality was largely due to deaths occurring in late life and from a circulatory or degenerative group of diseases, but an investigation made in which the mortality was based upon the M. A. table and ages at entry showed that this extra mortality from circulatory disease was largely controlled when the examination was made and the policy was issued after age fifty.

In one way the results of our investigation apparently differ from that of Dr. Symonds. While he does not clearly so state, it would appear from his paper that the larger risks taken by the Mutual Life had shown a lack of persistency. Our experience is directly the contrary. We had an extraordinarily good persistency among our larger policyholders. This is demonstrated by the following table:

NEW ENGLAND MUTUAL Persistency of Policies \$20,000 & over 1875-1917		NEW ENGLAND MUTUAL General Persistence of Policies since 1896	
Year	Per Cent.	Year	Per Cent.
	100.0%		100.0%
1	91.6	1	82.7
2	86.1	2	75.3
3	80.7	3	69.7
4	75.2	4	65.1
5	72.1	5	61.3
6	68.7	6	58.0
7	65.2	7	55.1
8	62.2	8	52.5
9	59.0	9	50.2
10	55.6	10	48.1
11	53.6	11	46.3
12	51.2	12	44.7
13	48.5	13	43.2
14	46.1	14	41.8
15	44.0	15	40.4
16	41.7	16	39.1

250 Twenty-Ninth Annual Meeting

Such papers as have been furnished us by Dr. Symonds are of the greatest importance and are very properly accepted as being almost the final word on the subjects treated. For this reason it is important that the conclusions reached should be based upon the facts presented and should be of such a nature as not to carry with them more force than they deserve. I always hesitate to criticize any conclusion reached by Dr. Symonds, but in this instance I do feel that a little of the force of his five "Inferences" should be taken away. Not because I believe they may not be accurate, but as I feel sure that they are simply matters of opinion and certainly not justified by the facts brought out in this paper.

Dr. Symonds draws five inferences. The first and the last, and therefore those which will carry the most weight, imply, if they do not definitely state, that most if not all of the trouble with these groups, involving the larger amounts of insurance, depend upon the idea that men of wealth, standing, and prominence "eat and drink more than the average and more than they ought to." After a somewhat careful study of the paper I do not find that any evidence of this sort is furnished. I appreciate that the idea is an extremely popular one at this time, but at least it is "not proven."

My experience leads me to differ with Dr. Symonds. I do not believe that these particular men do as a rule eat or drink more than the average life insurance risk. My belief is not important. But I do feel that the paper is too valuable to be weakened by statements of opinion, the accuracy of which is at least open to question.

Dr. Jaquith—Dr. Fisher is not with us, but he is doing his part, and I have here his discussion of Dr. Symonds's paper, which the Secretary will read.

The Secretary then read the following discussion by Dr. J. W. Fisher:

DISCUSSION

This association is greatly indebted to Doctor Symonds for the very clear and exhaustive manner in which he furnishes all of the facts relating to the subject of mortality of large risks accepted by the Mutual Life. It enables each of the members of the association to form his own conclusions.

My observation has led me to believe that many companies do not apply as rigid rules in the selection of large risks as are applied to the average risks accepted by the company. In my opinion, an application for a large amount should be considered as an impairment. We should know, in each case, the exact amount of insurance carried and contemplated by the proposed applicant, and our first concern should be to determine whether or not there is a question of over-insurance. This point can be determined, with a reasonable degree of accuracy, by commercial agency reports and also by consulting Dun and Bradstreet.

And as to other impairments, our rules regarding selection should be more rigidly adhered to than in the average risk. Doctor Symonds states, "Theoretically, we ought to reject risks for large amounts, where the alcoholic habits are in doubt, even more promptly than when the application is small." Then he adds, "I wonder in practice whether we do rigidly apply this rule." From this we must infer that the Mutual Life does not, and we must also infer that the same rule applies to other impairments. In this connection, I have often wondered how the percentage of large risks, of companies doing a sub-standard business, are insured at sub-standard rates, as compared with their general business. When we consider the treatment accorded applicants accepted by the Mutual Life, who were overweight or had other impairments, it would appear that these classes were accepted somewhat more freely in the large insurers than in the average risk. Table F in the Doctor's paper shows the death rate from different causes for different groups at ages of entry. Circulatory diseases, nephritis, genito-urinary diseases and suicide all show an excess

252 Twenty-Ninth Annual Meeting

mortality for each group, indicating that an undue proportion of large insurers were accepted who had unfavorable habits. This is borne out by the figures shown in Table G. It is also shown that heavyweights were freely taken. The fact that the Mutual Life has discontinued, since 1906, its former practice of paying especially high commissions on large risks, does not account for the higher mortality in these classes, as we find the mortality for the years of issue of 1906-1915 shows no improvement over the mortality of the years of issue 1896-1905.

We will have to take issue with the Doctor in his fifth conclusion, in which he states: "No first-class company can secure as favorable a mortality on large risks as on the general business of the company." This had always been my theory and belief until the Northwestern Mutual recently compiled their mortality statistics on their limit cases. Notwithstanding the fact that when we computed our mortality on the limit cases of the company in 1894, at which time the limit of the company was \$50,000 (this investigation covered also the cases for \$30,000, which was our limit up to 1886), the mortality was found to be a few points lower than the general average mortality of the company covering the same period, it was assumed that a longer exposure would show a relatively higher mortality. A few months ago, we computed the mortality on our limit cases of \$100,000, the limit having been increased to this amount in 1898. We found we had accepted 1,305 cases during this period, and the expected mortality was computed from the date that the amount was approved, which brought the case up to the amount of \$100,000. Others had been taken for the full limit on one application, and the mortality was taken by lives. While this data does not conform exactly to the class covered by Doctor Symonds's paper, the same principles are involved in both.

The mortality for the first five years is somewhat striking in the Mutual Life's experience in all periods and all groups, except Class I in the period 1896-1905, which shows that there was a rather larger element of self-selection than is found in

those insured for moderate amounts. Your attention is called to the mortality for the first five years and also after five years, in the Northwestern's experience.

A very important element of selection, in my opinion, is the care exercised by the well-posted and conscientious agent, and the same applies to the local examiner.

The Northwestern Mutual, has at no time in its history been subjected to high-pressure methods of securing business. Many years ago, the company promulgated a no-brokerage and anti-rebate rule, and never has accepted reinsurance or reinsured any of its risks. The experience of the Northwestern is similar to that of most companies, namely, that the lower the premium and the larger the policy, the greater the mortality. Thus far, however, the mortality on the limit cases accepted by the company has not been in excess of the general average mortality of the company covering the same period, which undoubtedly is due to the application of more rigid rules in the selection of limit cases. The number exposed, however, is not large.

MORTALITY EXPERIENCE OF THE NORTHWESTERN MUTUAL LIFE INSURANCE CO.

LIVES APPROVED FOR \$100,000, 1898-1915, INCLUSIVE, TO ANNIVERSARY,
IN 1916

INCLUDING CASES WHERE THE ADDITIONAL INSURANCE APPLIED
FOR WOULD, IF DELIVERED, HAVE BROUGHT THE TOTAL
IN FORCE TO \$100,000

(A) PREVIOUS INSURANCE IN FORCE ON SAME LIFE WHEN FIRST APPROVED FOR \$100,000;
NEW POLICY DELIVERED

Lives	1ST YEAR		2D TO 5TH YEAR		AFTER 5 YEARS		TOTAL	
	Actual	Tabular	Actual	Tabular	Actual	Tabular	Actual	Tabular
717	600,000	846,126	1,500,000	2,995,046	2,700,000	4,438,498	4,800,000	8,279,670
	70.9%		50.1%		60.8%		58.0%	

Average Duration: 1 to 5 Years, 3.1 Yrs.; After 5 Years, 10.5 Yrs.; Total 7.4 Yrs.

254 Twenty-Ninth Annual Meeting

MORTALITY EXPERIENCE OF THE NORTHWESTERN MUTUAL LIFE INSURANCE CO.—Continued

(B) PREVIOUS INSURANCE IN FORCE ON SAME LIFE WHEN FIRST APPROVED FOR
\$100,000; NEW POLICY NOT DELIVERED

Lives	1ST YEAR		2D TO 5TH YEAR		AFTER 5 YEARS		TOTAL	
	Actual	Tabular	Actual	Tabular	Actual	Tabular	Actual	Tabular
248	200,000	290,315	700,000	931,510	100,000	888,711	1,000,000	2,110,536
	68.9%		75.2%		11.3%		47.4%	

Average Duration: 1 to 5 Years, 2.9 Yrs.; After 5 Years, 9.1 Yrs.; Total 6.0 Yrs.

TOTAL (A) AND (B)

965	800,000	1,136,441	2,200,000	3,926,556	2,800,000	5,327,209	5,800,000	10,390,206
	70.4%		56.0%		52.6%		55.8%	

Average Duration: 1 to 5 Years, 3.0 Yrs.; After 5 Years, 10.2 Yrs.; Total 7.0 Yrs.

(C) NO PREVIOUS INSURANCE IN FORCE ON SAME LIFE WHEN FIRST APPROVED
FOR \$100,000; FULL AMOUNT DELIVERED

199	100,000	220,355	300,000	674,324	500,000	648,745	900,000	1,543,424
	45.4%		44.5%		77.1%		58.3%	

Average Duration: 1 to 5 Years, 2.9 Yrs.; After 5 Years, 9.7 Yrs.; Total 6.0 Yrs.

(D) NO PREVIOUS INSURANCE IN FORCE ON SAME LIFE WHEN FIRST APPROVED
FOR \$100,000; LESS THAN FULL AMOUNT DELIVERED

141	None	156,894	300,000	524,597	500,000	404,258	800,000	1,085,749
			57.2%		123.7%		73.7%	

Average Duration: 1 to 5 Years, 3.1 Yrs.; After 5 Years, 8.6 Yrs.; Total 5.9 Yrs.

TOTAL (C) AND (D)

340	100,000	377,249	600,000	1,198,921	1,000,000	1,053,003	1,700,000	2,629,173
	26.5%		50.0%		95.0%		64.7%	

Average Duration: 1 to 5 Years, 3.0 Yrs.; After 5 Years, 9.3 Yrs.; Total 5.9 Yrs.

TOTAL (A), (B), (C), AND (D)

1305	900,000	1,513,690	2,800,000	5,125,477	3,800,000	6,380,212	7,500,000	13,019,379
	59.5%		54.6%		59.6%		57.6%	

Average Duration: 1 to 5 Years, 3.0 Yrs.; After 5 Years, 10.0 Yrs.; Total 6.7 Yrs.

**MORTALITY EXPERIENCE OF THE NORTHWESTERN
MUTUAL LIFE INSURANCE CO.**

**LIVES APPROVED FOR \$100,000, 1898-1915, INCLUSIVE, TO ANNIVERSARY
IN 1916**

**INCLUDING CASES WHERE THE ADDITIONAL INSURANCE APPLIED
FOR WOULD, IF DELIVERED, HAVE BROUGHT THE TOTAL
IN FORCE TO \$100,000**

BY AGES AT ENTRY AND POLICY YEARS. OLD AMERICAN EXPERIENCE TABLE

Entry Age	Lives	1ST YEAR		2D TO 5TH YEAR		AFTER 5 YEARS	
		Actual	Tabular	Actual	Tabular	Actual	Tabular
24-39	427	100,000	381,389	500,000	1,166,765	800,000	999,351
40-49	584	500,000	655,749	900,000	2,274,683	1,600,000	2,910,774
50-60	294	300,000	476,552	1,400,000	1,684,029	1,400,000	2,470,087
Total	1305	900,000	1,513,690	2,800,000	5,125,477	3,800,000	6,380,212
		59.5%		54.6%		57.6	

Entry Age	TOTAL		Per Cent
	Actual	Tabular	
24-39	1,400,000	2,547,505	55.0
40-49	3,000,000	5,841,206	51.4
50-60	3,100,000	4,630,668	66.9
Total	7,500,000	13,019,379	57.6

NOTE: About 550 lives were at risk for \$100,000 each in 1916. Average age at entry 43 years.

Dr. Willard—Dr. Symonds's paper has large justification because the number of cases of insurance for large amounts which we will be called upon to consider will constantly increase. The war conditions have accounted for many that have been presented, and the income tax and inheritance tax will furnish the cause for many others.

256 Twenty-Ninth Annual Meeting

Dr. Symonds has been extremely thorough, as he is in all of the work he has presented to this Association, and no questions can be asked him which he has not endeavored to answer by a very thorough arrangement and classification of materials. His work has been excellent from an actuarial standpoint, and I have pleasure in reading the comments of Mr. Craig, our Assistant Actuary, who has reviewed the paper from an actuarial standpoint.

"The great point of interest in the paper is that with 3742 accepted risks, covering \$287,000,000 of insurance, the company has had a mortality experience reasonably close to that expected under the Medico-Actuarial Table, the figures being 106.9% on number and 112.6% on amount, although this 112.6% is really reduced to 107.3% on account of reinsurance.

At first glance Table F might indicate a mortality nearly double the experience of the company, the total deaths per 10,000 exposures being 146.9 on the large policies and 78.8 on the general experience. The total death rate for the general experience of 78.8 seems low (it was 117. in 1917), but upon close examination, it will be found that Tables B and F substantiate one another in that the greatest difference between the ratio on large policies and the ratio on the general experience occurs at the younger age groups, while the smallest difference is at the higher age groups, and the difference in total figures may therefore be due entirely to the age distribution. In fact, the average age at issue on large policies was 42, while for the general experience the total death rate is but little more than the average figure for ages 30 to 44.

To show in another way the harmony between Tables B and F, it need only be observed that under Table F the ratio is 45.5% for ages 15 to 29 in the general experience and 71.4% for large policies, thus making the ratio for large policies 157% of the general experience, while under Table C at ages 20 to 29 the actual mortality was 158.8% of the probable according to the Medico-Actuarial Table and presumably this table corresponds fairly closely to the general experience.

The paper as a whole confirms the general opinions that have

been held. The maximum amount of insurance a company might assume on a risk has been discussed from the viewpoint of the single risk, as well as from the viewpoint of the class. It is generally believed that large risks can be taken freely, provided there is a sufficient volume of business to make a fair experience, but where the amount of insurance is so large as to make the class exclusive, the effect upon the surplus of the company in event of death is the determinating factor. The paper shows that Class I., risks from \$50,000 to \$100,000, ~~was of sufficient volume to give a reliable experience and with~~ total exposures of 20,000 and over with \$1,250,000,000 of insurance, the mortality was only 104.7% of the probable by amounts.

Class II., risks from \$100,000 to \$250,000, was much smaller, showing a mortality of 98%.

While it shows a mortality of 287.7%, Class III., risks over \$250,000, is too small for anything but indications and presumably the determining factor in the risks of Class III. was not the obtaining of a sufficient volume of exposures to determine a class, but rather the effect upon the company's surplus of one death, and this has been well taken care of by Dr. Symonds's company in the distribution of its reinsurance policies, where with over \$2,848,000 of claims, \$1,792,000 was covered by reinsurance. Of course, we appreciate Dr. Symonds's statement that the reinsurance risks taken by his company have shown heavy mortality, but our point here is that the pecuniary loss to the company on account of the extremely large risks has been protected by reinsurance.

In connection with these large policies it should be observed that over the period of 31 years, during which there were 5 deaths with insurance of \$2,848,300, 2 of the deaths with insurance of \$773,300 occurred in the first policy year and 1 with insurance of \$1,000,000 occurred in the second policy year, and if these 3 claims had been omitted, the experience would have been practically normal. The experience in the early years as brought out by the paper is of great importance and it may be interesting to note that under Table C the business issued under Class I. in the last decade given shows the worst mortal-

258 Twenty-Ninth Annual Meeting

ity in the first and second years. After 5 years the experience is only 108.6%, while under Table D for Class II. the experience after 5 years is only 72.6%.

The heavy mortality is developed not only at the early years, but at the younger ages. In Class I. the mortality improves as the age advances, while in the other classes the experience is small and young men are not in a position to buy large amounts of insurance.

The point raised by Dr. Symonds under "B," where he says that a man has been known to convert his policy into Extended Term Insurance and then commit suicide shortly before the date of expiry, is of particular interest in policies for large amounts and it would be interesting to know if any of the cases referred to as known would have affected the experience given. They were not included in the calculations, as Dr. Symonds tells us in the first paragraph the policies exchanged for reduced paid-ups or for extended insurance were treated as terminated.

The conclusions drawn by Dr. Symonds do not refer particularly to the heavy mortality at the younger ages and the early years, but earlier in the paper reference is made to the intelligence and force of the men who take large insurance, and it might be easily possible that men of this foresight who in the days of great competition for business by the companies as outlined in the paper took these large amounts at small cost to themselves, but at greater cost to the company.

It would be interesting to compare these mortality ratios with the corresponding ratios of the company as a whole, but these latter are not available. In Volume XIV. of the *Transactions of the Actuarial Society of America*, beginning with page 277, the mortality experience of the Provident Life and Trust Company is presented, and on page 305 of this paper, the percentage of the Provident Ultimate q_x to the q_x of the Medico-Actuarial Ultimate Table is given, and the percentages given indicate that taken as a whole the Provident Life and Trust mortality was slightly better than that called for by the Medico-Actuarial Table, and on page 303 it is shown that the mortality actually experienced by the Provident Life and Trust

was 94% of the expected on Life policies, 82% on Term policies and 90% on Endowment policies. If the Medico-Actuarial Table had been used, the Probable claims would have been slightly greater and the ratios slightly less, but the comparison of the total experience of the Provident Life and Trust with large policies of the Mutual show that for Class I. the mortality after 10 years was better than the general experience of the Provident Life and Trust, although for 6 to 20 years Class II. was about one third higher. Class II. for 6 to 20 years is apparently less than the Provident Life's experience, while Class III. is materially higher.

Our own figures are very small and the results are not extremely valuable but they are given for what they are worth in the table below.

We issued 283 policies with over \$19,000,000 of insurance and during the first 5 years we expected 8 claims for \$550,000 and paid 8 for \$593,000. During the whole 17 years of our experience we expected 13 claims for \$915,547 and paid 11 claims for \$843,000. The first year's mortality is favorable, but the second year has been heavy. The following table shows the mortality in the usual form:

TABLE SHOWING SUMMARY FOR ALL POLICIES OF \$50,000 AND OVER,
ISSUED PRIOR TO JANUARY 1, 1917, AND TRACED TO POLICY
ANNIVERSARY IN 1917—EXPECTED DEATHS BY MEDICO-
ACTUARIAL TABLE VOL. III, PAGE 27

(A) BY POLICY YEARS

Policy Year	EXPOSURES		PROBABLE CLAIMS		ACTUAL CLAIMS		PERCENTAGE OF PROBABLE	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
1	283	\$19,329,706	1.6857	\$116,232	1	\$150,000		
2	225	15,503,643	1.7920	124,049	3	238,983		
3	176	12,378,410	1.5837	109,267	2	104,000		
4	145	11,054,710	1.5308	106,480	1	100,000		
5	122	9,001,360	1.3242	94,210	1	100,000		
1-5	951	\$67,327,829	7.9164	\$550,238	8	\$592,983	101.1	107.8
6-10	395	23,619,130	3.6883	272,622	2	150,000	54.2	55.0
11-17	62	6,075,850	.9272	92,687	1	100,000	107.9	107.9
All Years	1318	\$97,022,809	12.5321	\$915,547	11	\$842,983	87.8	92.1

We extracted from these figures those which had to do with re-insurance from other companies, and the percentage is less favorable than that shown in the table above, but the class was so small that no strong deductions can be drawn.

The subject is one which has always been regarded as of extreme importance by all companies, and it is only of late years that the limit on a single life has been gradually increased by companies generally.

If a sufficiently large number of cases are secured and the usual or even extra careful selection has been made, there should be no reason for apprehending an unsatisfactory result from a financial point of view if it were not for the ability of the applicant to conceal facts regarding his financial condition, his habits and his physical condition. Then too the people who offer themselves for large insurances are, generally speaking, somewhat different from the rank and file of those included in the general experience of insuring risks for the reason that having acquired confidence of greater or less size, "having made their pile," so to speak, after a long period of close application to business and industrious and regular habits, they are in the position of providing for the future and taking matters a little more easy, or as they say, "begin to enjoy life," and many appetites and capacities heretofore curbed are apt to be exhibited.

Dr. Symonds recounts these points and talks about habits apparently only from a standpoint of alcohol. It would seem to me that moral habits are also important, and I think some of us can recall the circumstances in some of our unfortunate cases where if we had known the facts regarding the moral habits of some of our applicants we would not have taken them as we did but rather, prematurely as it seems to us, paid death claims on the lives.

We have been told that a wrong way to study our mortality experience is to mull over death claim papers, but it does seem to me that a careful review of those cases which we have regarded as being, to say the least, unfortunate will make us feel that many early deaths in this class of cases are genuine sui-

cides though the facts are covered up by complacent coroners and the family physicians. We have all been imposed upon by the failure of the applicant to give a true and honest past physical history, and we have taken time and time again risks which you would not have taken if we had known facts concerning their financial condition which were completely withheld from us.

The problem will always be with us, and while Dr. Symonds does not suggest a method of dealing with these cases which is likely to give any better results than those which now obtain, we must, therefore, continue to exercise the utmost care in the acceptance of this class of business.

Dr. Rogers—Mr. Chairman, I brought to the reading of Dr. Symonds's paper a point of view bred in me by the rather extended experience of our company in writing risks for fairly large amounts and with a degree of liberality for a part of the time, so far as policy contract was concerned, rather greater than was practiced by any other company in the country. Our data was measured by a different table, and in the conversion from one table to another I have had to make allowance, and cannot give our results more closely than to say that the figures are substantially less favorable than those that have been submitted here to-day. In our larger risks we secured a mortality, as nearly as I could make it out, of 120 to 130% of the Medico-Actuarial table.

The figures produced by Dr. Fisher and those produced by Dr. Dwight show to my mind that the selection of large risks is a matter, first, of policy contract; and second, of care in the selection of risks. While I agree with the criticism that has been made that Dr. Symonds's conclusions are not fully supported by the paper itself, the points brought out by him I am in hearty accord with. Indeed, the paper is largely valuable by reason of his excellent presentation of the points that should be had especially in mind in making a selection of large risks. My only criticism of the paper is that a good deal of the data is too scanty to warrant such detailed analysis as he has applied to it. I believe in the old maxim of the actuaries,

that testimony is not really very valuable unless you can increase or decrease the deaths by the square root of their number, without materially changing the results. The testimony of the data in any single group is not very trustworthy, unless that group is very large. His Class I., Risks up to \$100,000, is fairly dependable. The other two classes are so small that I doubt that anything more than the very broadest conclusions may be drawn from them. For example, I see a group of 41 lives with a single death, and an expected .27 of a death, and a mortality of 369%. I think that unless there is quite a good deal of supporting testimony, groups of this sort were better left unstudied.

As to Dr. Symonds's general view of the selection of large risks, it shows the result of the very characteristic painstaking study that he always gives to anything that he does.

It has been said here this morning that this topic is peculiarly interesting just now because all of our companies are receiving very many more applications for larger amounts than formerly. The fact is, that economic conditions in this country have changed very monumentally. The introduction of the income tax and of the inheritance tax and the relation of the life insurance business to them make it a very much more valuable commodity to people of large means than formerly. There is not that incentive to speculation, or at any rate the proportion of speculation among our applicants for large amounts is very much smaller than formerly. When we receive applications for large amounts in our offices we must remember that there is now a justification for large amounts of insurance on a single life which did not formerly obtain. The element of speculation is very much lessened. I do not mean that we can lose sight of the element of speculation; I think we must continue to exercise a great deal of care in our selection of large risks, but certainly the proportion of entirely legitimate large business is very much greater now by reason of these recent changes in the laws of the land.

On the whole, this paper and the contributions from those who have discussed the paper, Dr. Fisher, Dr. Dwight, and

others, are extremely valuable and I am sure that the Association has profited greatly by them.

Dr. Toulmin—In the Penn Mutual we adopted the fifty thousand dollar limit in 1896 and the one hundred thousand dollar limit in 1900. I have here a study of these cases accepted between 1906 and 1911, to 1912 anniversary. There are 1,032 lives, with 53 deaths, showing two very interesting features in connection with the subject of attained ages: From 15 to 28, the mortality was 178% by the American Table; 29 to 42, 70%; 43 to 56, 79%; 57 and over, 139%. It might be interesting to note that of the total of 53 deaths, 23 were from cardio-renal disease, and 5 from suicide.

There is no question at all that, notwithstanding the fact that to-day speculation does not enter into the subject as it did formerly, and does not begin to play the part it did before, you cannot be too careful in the examination and selection of these large risks.

There is one other point that I should like to have brought out, if possible, and that is, the advantage of sending a man from the Home Office to examine cases for large amounts, wherever it is possible. I am very much interested in that feature of the work.

Dr. Porter—Replying to Dr. Toulmin's inquiry in regard to the value of sending a Home Office representative where possible, or of having these large risks examined by men who have been trained in the Home Office, it has been our practice to insist upon examination by such representatives in all of the large cases, that is, cases, formerly above one hundred thousand, now above one hundred and fifty thousand.

As to the value of such added care, we have no data; but it has been my good fortune to make as large a percentage of these examinations as anyone, in various parts of the country, and I have been impressed with the amount of information which can be obtained by such additional examination and care. The ordinary reports as they come in, even for large amounts, often fail to give a true picture. A great deal of important information is brought out by further inquiry and not merely

by medical inquiry, but in matters of inspection and financial standing. Where a Home Office representative is required to make the examination in a case of large amount, he is instructed to consider not only the medical aspect of the case, but the insurable interest, and I have personally brought out a large amount of interesting and valuable information by inquiry along that line which is not ordinarily covered by the examiner unfamiliar with Home Office requirements. Furthermore, in the detail of examination, and purely as a result of physical examination, irrespective of the personal history, a good many decisions have been reversed, so that my answer to Dr. Toulmin's inquiry is, that a trained man should invariably be employed as one of the examiners, where large amounts are involved.

Dr. Toulmin—If your experience is at all general, I think it is extremely valuable. There were presented to me in the last few days examinations by two men, one of whom had done an enormous amount of our work, the other a fair amount of work, both above the average examiner, and the papers were absolutely clean. Dr. Porter, examining the applicant about the same time, had found some casts and a low blood-pressure. It is a very interesting and instructive case and because of it I brought the question up.

Dr. Porter—In that particular case, the interesting feature was the fact that the tendency to a low blood-pressure had not been brought out at all, and the highest systolic blood-pressure I could possibly get was 100, subsequently confirmed by one of these men and a number of others.

Dr. Weisse—There is another point. You take a man who is a big toad in the puddle, he owns the whole town, he controls practically everything in the town. He is examined by a doctor who is his family physician, and by another man. It is worth the position of these men in the town, it is worth their practice, not to be too exacting in their questions. We have had that brought out in several cases where we dug up information, and it turned out that the local examiner was perfectly conversant with that information but did not dare give it out.

Dr. William R. Ward then read the following discussion by Dr. G. A. Van Wagenen, who was absent in the South:

Dr. Symonds's elaborate paper reaches the same conclusion in reference to the mortality on large risks as "The Mortality Investigation of the Actuarial Society of America" in 1899 did on risks of \$20,000 and over on the same application. This investigation covered 30 years, and if we include all ages, from 15 to 70, gave a mortality of 107.8 per cent by the modified healthy English table they used, which would be 88.5 per cent by the American table—a mortality no Medical Director would be proud of! If we take the ratio by years of insurance, as Dr. Symonds has done, they found:

	<i>English Table</i>		<i>American Table</i>
1st to 5th year	110.5	or	78.9
6th to 30th year	105.8	or	98.3
1st to 30th year	107.8	or	88.5

Those of us who have carefully watched the outcome of our heavily insured members as compared with that of the average risk probably anticipated a higher mortality; but the advantage of careful statistical work is not alone that it confirms our opinion, it also gives a reliable *scale* by which we can measure the departures from normal. However, we must never forget that only the mortality averages of our own company can give the *exact* scale we should each use.

Medical Selection has too long been a haphazard guess based on personal experience! This accounts for the wide difference of opinion among us in reference to many classes of risks, and the consequent disparity in the offers of various companies to the same impaired risk.

I am unable to give any such array of figures as Dr. Symonds has represented since our company's present limit is only \$100,000, to which sum it has been gradually raised, as the company had enough members in the class below to make it fairly self-sustaining. (In 1901, it was still \$50,000; in 1909,

266 Twenty-Ninth Annual Meeting

it was raised to \$75,000; and only in 1912, was it made \$100,000.)

While our average policy has advanced steadily until it is now nearly \$3500 (3472), yet the rapid increase of our large risks has been recent, giving little material for extended mortality statistics. However, it is well to remember that \$50,000 ten or twenty years ago was about equivalent to \$100,000 at present.

Our actuary, Mr. Percy Papps, and his assistant, Mr. Herbert Rhodes, have kindly given me the following comparison between our *average* mortality and that on risks of \$25,000 and over, for the years from 1900 to 1911 inclusive, arranging the figures to show mortality from the 1st to the 3d year, from the 4th to the 6th year, and from the 6th to the 11th year of duration. The American Table of Mortality is used and the first column shows the per cent of actual to expected deaths on our policies of *all* amounts combined, for the period indicated. The second column gives our mortality percentages of actual to expected deaths, *only* on risks of \$25,000 and over. (In all cases where increased insurance carried the risk above \$25,000, the experience is based *only* on the policies which covered the excess.)

TABLE

Duration Years	Co.'s average mortality <i>all risks</i> , 1901 to 1911. Per cent of actual to expected deaths	Mortality on policies <i>over</i> \$25,000 and where increased to over \$25,000, only on the increase
1-3	44.7	36.91
4-6	56.1	77.19
6-11	68.0	89.36

While this shows a *lower* mortality of 7.79 per cent in favor of the larger risks for the first three years only, from the fourth to the sixth, the larger risks were 21.09 per cent *worse* than the average; and from the sixth to the eleventh, they were 21.36

per cent worse. (I may add that our large policies do not show enormous lapse in the early, and especially the first years, that the Mutual Life had. Most all of it being legitimate insurance, it was kept in force. Our commissions are not increased and there is no special bid for such cases. Indeed the agents say, "It is easier for the camel to go through the eye of the needle" than to get an applicant into the Mutual Benefit for its limit! We do no reinsuring of any part of our large cases, and we do not reinsure for any other company. We may congratulate ourselves on that fact, in view of the mortality of 186 per cent Dr. Symonds quotes.)

The only figures with which I can make a fairly good comparison is Table C by policy years, and here it will be seen our mortality is more favorable than the early \$50,000 to \$100,000 issues of the Mutual Life, being about 57 per cent instead of 125 for the first five years, and 90 instead of 112 from the 6th to the 10th year. (The later issues of the Mutual Life, however, show a much better mortality, probably being more carefully selected.)

All large applications to the Mutual Benefit are *very* carefully selected. We require two separate and complete medical examinations: microscopical examination of urine at the Home Office laboratory; a double inspection; the review and approval of two Medical Directors, with a final review and approved by our Executive Committee. The largest cases must be exceptionally good in *every* particular. But notwithstanding this extra care, you will notice a markedly unfavorable comparison between our ordinary mortality and that on the large risks.

All figures so far presented to our Association prove that large policies are more advantageous to the insured and to the agent, than to the company, no matter how carefully selected!

Time was too short for me to obtain the causes of deaths in the Mutual Benefit cases over \$25,000, but having passed on our losses for many years, I am not surprised that Dr. Symonds finds Bright's, circulatory diseases, and genito-urinary lesions, to show an increase in this class. These men are most all past middle life, wealthy, and are generally either over-

268 Twenty-Ninth Annual Meeting

worked or idle, conditions favoring indulgence and consequent degenerative disease. I am surprised, however, at the increased deaths by casualty, and especially suicide, among the large insurers. This has not been our experience, I feel quite sure.

The Secretary read the following discussion by Dr. Arthur B. Wright:

Dr. Wright—We are unaware of any published experience which shows anywhere near as complete an analysis of the mortality on large policies as has been attempted. We are certainly indebted to Dr. Symonds for gathering together and making public the results of experience which will be of great value to all, particularly as this experience could not possibly be obtained by most companies because they have nowhere near the volume of business and the consequent large number of big cases which are necessary to make any analysis of them reliable. This experience, especially the analysis by policy years, is much more satisfactory than hitherto published because it is based on a select table. It would be interesting to learn whether the experience on the paid-up and extended term policies which are excluded would materially affect the results, especially in view of Dr. Symonds's remarks under "B" with reference to the various questions involved in selection, that "he has been known to convert his policies to extended term and then commit suicide shortly before the date of expiry. Intrusions of this class, therefore, may affect their mortality rate for some years after entrance . . . "

If the Mutual Life's mortality rating on its total standard business is approximately the same as the M.-A. Experience, as is supposedly the case, their extra mortality on applications for large amounts would be considered very favorable, being only 112.6% of the expected, and remarkably favorable if the reinsurance is deducted, being only 107.3%. This shows considerable success in their selection, in view of the great pressure that is brought to bear on underwriters to overlook im-

pairments and to accept large risks for the benefit of their prestige and consequent value in soliciting other prospects. The Travelers has no corresponding experience worked up, but their experience by amounts, based on the American Experience Table, on policies for \$10,000 and over on all years of issue from 1866-1916 inclusive, covering the combined exposure of 1897-1916 inclusive, is .814 of the expected against .806 of the expected for policies of \$5000 to \$10,000 and against .754 of the expected for corresponding experience on all standard policies.

Some facts are brought out with such special force by Dr. Symonds's statistics that we feel they should be borne in mind in any future underwriting, at least until they are questioned, if ever, by further statistics, as for instance, the very heavy extra mortality on large policies issued at ages before 40. The decided decrease in mortality with increasing age at issue makes one wonder whether this is a confirmation of what might be supposed would be the case; that is, that men who work hard for their wealth, obtaining it in middle life or later, are so interested in their work for their work's sake, or otherwise have their habits so fixed, that they change their manner of living comparatively little, so that their wealth has little effect on their mortality rate, while men who inherit their wealth, or acquire it suddenly in early life, are especially given to enjoying their wealth, involving eating and drinking too much. As Dr. Symonds brings out, this is one of the principal causes of heavy mortality among applicants for large amounts of insurance.

Many of the conclusions Dr. Symonds arrives at verify what would be our "a priori" conception, as for instance, the proportionately heavy death rate from degenerative diseases.

The mortality experience of the Mutual Life on business that it had reinsured with other companies as well as on business it had reinsured for other companies is surprisingly high, though some extra mortality might naturally be expected. The Travelers mortality rate on the basis of the American Experience Table on Years of Issue 1866-1916 inclusive, cover-

270 Twenty-Ninth Annual Meeting

ing the combined exposure of 1897 to 1916, is .822 of the expected by amounts of insurance, whereas the corresponding experience of the Company's total standard business was .754 of the expected.

Most discussions, which so frequently but usually unconvincingly argue that there has been an appreciable improvement in mortality, emphasize that such improvement is due largely not only to improvement in medical science but to improvements in sanitary conditions and to the better education of the people along sanitary lines. These probably have less effect among the wealthy than they have among classes of population or among the classes of insured lives usually investigated, so that probably the greater part of the improvement in mortality shown at various places in Dr. Symonds's paper is due rather to the improvement in methods of selection exercised by the Mutual Life. In fact, this point is brought out specifically by Dr. Symonds in reference to overweights who were accepted quite freely before 1903 by the Mutual Life.

In applying any lessons to be learned from this paper it must be borne in mind that the experience of the Mutual Life would be different from that of other companies, due not only to the use of different examiners in the field, and to different methods of selection in the Home Office, as is true in the case of any experience of individual companies, but also to the fact that the Mutual Life, as I understand it, has a separate and distinct system of their own of obtaining Inspection Reports on prospective applicants. That this feature would have especial effect on applicants for large amounts of insurance is indicated by Dr. Symonds's remarks on how careful one must be to obtain full information in such cases as to the financial condition and personal habits of the prospect.

Dr. T. H. Rockwell—When such a careful observer as Dr. Symonds makes an analysis of a type of risks extending over a long period of years, this experience being of a very considerable volume occurring in a large and conservative company, the results are likely to be fairly indicative of a similar experience in other companies. It is interesting, therefore, to know

whether others who have accepted such risks are in a position to confirm his findings. The initial selection of this class being so well known to you all, I feel it would be presumptuous on my part to offer any suggestions along these lines.

The Equitable has computed its mortality experience with large risks at various times and for various periods. In 1905 we completed it for all risks from \$50,000 up for the issues of 1868 to 1903. The manner of computing this experience differs somewhat from that of the Mutual Experience from 1885 to 1915. The experience of the Mutual is by selection units of \$50,000 and larger amounts, while our 1868 to 1903 Experience includes the risks on any one life, as soon as they reached the amount of \$50,000 and such a risk was continued as a part of the Experience even though later on it may have decreased below \$50,000 as paidup insurance. But this difference in the material for these large risk experiences of the two companies does not, in my estimation, prevent a comparison of results.

The Equitable Mortality of the 1868 to 1905 large risks was found to be 10% of the general experience with all risks from 1859 to 1899, while the Mutual Experience is shown in Dr. Symonds' paper as 107% of the mortality of all risks carried from 1885 to 1915. These results show a substantial agreement of the mortality of large risks in the two companies, as we may assume that the general mortality of the two companies is not greatly dissimilar, both following the M.-A. Table closely.

Besides the general experience with large risks from 1868 to 1903, the large risks assumed by the Equitable from 1906 to 1913 and carried to 1915 can be compared with the Mutual Life Experience of large risks issued from 1906 to 1915 and carried to 1916. The total result by policies is 100% of the M.-A. for the Mutual Life and 119.6 of the Equitable Select (and Ultimate) table for the Equitable Life. The difference is apparently considerable but is so only apparently. The reason is this: The Equitable Select rates of mortality are from 7% to 30% lower than the M.-A. Select rates, likely be-

cause the Equitable Select rates are based principally on risks assumed from 1899 to 1908. The Equitable Mortality Table also excludes southern risks, the M.-A. does not. This difference just about accounts for the apparently higher mortality of the Equitable large risks of the 1906 to 1915 Experience, the great bulk of this experience being within the so-called period of selection.

The total loss in the 1906-15 Mutual Experience is 42 risks, in the corresponding Equitable Experience it is 44 risks. This number of risks is too small to admit of much analysis, but our general experience with large risks as to causes of death, incident of deaths in the various age groups and in the various periods of exposures, harmonize very closely with that of the Mutual Life, as closely as the result with large risks as a whole.

We are, therefore, able to confirm the experience of the Mutual Life, namely, that policies for a large amount show a very considerable increase over the Society's normal mortality and a most careful selection is desirable before accepting this class of risks.

Dr. Jaquith—I feel that this paper of Dr. Symonds has been a very valuable contribution, and I am deeply grateful to those who have taken part in the discussion, for what they have added to it. We will now proceed to the next paper.

Women are replacing men in a wide range of activities and, as a consequence, an ever increasing number are feeling the need of and are seeking life insurance. Dr. Beckett's paper, dealing with "Pelvic Surgical Conditions Affecting Female Risks" is very timely and should interest all of us.

Pelvic Conditions and Female Risks 273

SOME PELVIC SURGICAL CONDITIONS AFFECTING FEMALE RISKS

By Dr. W. W. BECKETT

The purpose of this paper is to call special attention to the advisability of a careful examination of the pelvic organs of female applicants for life insurance.

From an insurance standpoint we are more concerned about chronic pelvic inflammatory conditions, lacerations of the vaginal soft parts, malformations, growths and degenerations of the pelvic organs, than the acute inflammations due to septic or gonorrheal infections. The acute inflammatory processes are apparent at the time of examination while the conditions above mentioned may be easily overlooked without a careful pelvic examination.

DYSMENORRHEA

This condition is usually due to a congenital stenosis of the cervix, a flexion of the uterus, or to some disease of the endometrium. If not severe it may not affect the risk, but if severe the applicant should be postponed until cured

VAGINA

Cysts of the vulvo-vaginal glands, varicose tumors, and hematoma of the vulva can be dealt with surgically with but little danger to the patient and with no impairment to her future health. The same may be said of the benign vaginal growths. Lacerations of the parturient canal produce the commonest diseases of women. Lacerations of the perineum if not repaired at once usually require surgical treatment at some later date. The bad results that follow neglect of the primary operation are very numerous. The injured muscles retract and undergo atrophy, and when repaired seldom possess their former strength. Involution of the vagina and the uterus may be arrested, and vaginal and uterine prolapse

274 Twenty-Ninth Annual Meeting

and all the disasters incident to subinvolution may occur. These conditions may in time require serious surgical treatment. Nearly every woman suffers with a laceration of the cervix uteri to a greater or less extent at her first labor. The majority of these lacerations heal during the puerperium and give no subsequent trouble. The more extensive lacerations of the cervix, however, do not heal readily, and as a result there is a large patulous and granulating opening which often ulcerates and becomes a prolific cause of malignant degeneration. Modern midwifery has, however, overcome much of the bad results of former days, yet we see many neglected cases at the present time. Only by a careful vaginal examination can the extent of these lacerations and diseased conditions be determined.

CHRONIC INFLAMMATIONS

Chronic endometritis, salpingitis, ovaritis, and pelvic peritonitis are diseases which in time usually require surgical treatment. After the acute inflammation has subsided there may come a quiescent period of varying duration when the patient is quite free from distressing symptoms. Usually, however, there follows a train of symptoms which renders the patient a semi-invalid which only surgery can relieve.

In all applicants presenting a history of past inflammatory disease, whether severe or moderate, there should be a vaginal examination without which a correct prognosis can not be made.

DISPLACEMENTS

Uterine displacements vary from a slight degree with no discomfort or injury to the patient to a degree that may require surgical treatment. A displacement that may not cause discomfort to-day may be a serious condition to-morrow. The degree of uterine displacement can only be ascertained by an examination.

Pelvic Conditions and Female Risks 275

ABORTION

Abortion may result from many causes. As a rule in first pregnancies it is the result of drugs or mechanical measures to get rid of the uterine contents. When the uterus is diseased from previous infection or from induced abortions, pathogenic changes may render it incapable of nourishing the incumbent until full term, and abortion results. Syphilis is frequently thought to be the cause of repeated abortions, but in most cases they are independent of this disease. An abortion may be productive of serious results. An applicant who has aborted should be postponed for two years or until after a normal labor.

It is a good rule to postpone newly married applicants until two years after marriage or until after a normal labor. Many young women will resort to abortion during the first year or two after marriage who would not permit any interruption of a normal pregnancy later on.

OVARIES

The peculiar feature in the clinical history of tumors of the ovary is the absence of subjective symptoms. In many cases patients have not known of anything being wrong until the tumor became noticeable by the increased size of the abdomen. These growths when small do not usually cause pain and are only discovered by pelvic examination.

Cystic ovarian tumors may occur very early in life. The writer removed a cystic tumor of the ovary from an infant only thirteen weeks old. These tumors are prone to degenerate. Many that at time of removal are thought to be benign, are, upon microscopical examination, found to be malignant. At the Würzburg clinic, during a period of seven years, 55 out of 239 cases of ovarian tumors, including papillomatous cysts, were malignant. More than 50% of malignant disease of the ovary recur soon after their removal. Malignant disease of the ovary is most frequent in single women. As a rule, benign ovarian growths are easily removed and with but little danger

276 Twenty-Ninth Annual Meeting

to the patient and if free from adhesions at time of operation no untoward after results need be apprehended.

Ovarian tumors are of common occurrence. In 171 abdominal operations for pelvic disease in women, reported by Laroque, 54 were for ovarian tumors. Ovarian growths, like tumors of the uterus, are usually associated with some other pathological condition.

CANCER

The mammary glands and the generative organs are affected in about 40% of all cases of malignant disease among women, occurring in the generative organs about one-third more frequently than in the mammary glands. Cancer of the uterus is the cause of death in over 20% of the total deaths of cancer of all other parts of the body.

But few cases of cancer of the female organs are recorded under age 30. The greater number of deaths occur between the ages of 50 and 55. Dr. George Beatson states that cancer occurs most frequently at the cessation of reproductive life. Just what influence heredity plays has not been definitely determined. It is generally conceded that heredity can be almost altogether ignored in the selection of risks. It is the writer's opinion, however, that there is a hereditary constitutional tendency which may be influenced by habits, mode of life, or environment. Cancer occurs rather more frequently in over than in underweights, and in married women and widows than in spinsters. This is especially true of the female organs, being four times more frequent. Primary cancer of the body of the uterus is probably not more frequent in mothers than in women who have never been pregnant.

In a large majority of cases cancer of the cervix is due to injury during childbirth. While cancer on the whole is on the increase, the mortality from cancer of the uterus is decreasing. This may be, as has been pointed out by Hoffman, due in part to the diminishing birth rate. Better midwifery is no doubt also a contributing factor. Childbearing increases the risk of

Pelvic Conditions and Female Risks 277

uterine and decreases the risk of mammary cancer. In cancer of the cervix there is soon glandular involvement. Cancer of the body of the uterus may exist months or even years without the glands becoming affected. Hence in cancer involving only the body of the uterus the prospect for a complete cure after removal is greater than if the cervix is affected. Wertheim states that in almost all cases in which there is glandular involvement there is a recurrence. For anatomical and technical reasons the affected glands are seldom all removed. Cullen of Johns Hopkins found that in nearly every case of cancer of the cervix the recurrence was in the vaginal scar.

In all malignant diseases of the female pelvic organs, surgeons have failed to permanently cure more than a small percentage of the cases operated. Wertheim claims 42% without return for five years. But few surgeons claim better results. There are a few remarkable exceptions in every surgeon's experience. The writer has had several cases of more than twelve years, standing without recurrence. It is impossible to know just which is going to be the exceptional case.

UTERINE MYOMATA

Myomatous growths of the uterus are usually benign and only cause trouble by reason of their mechanical presence resulting in pressure symptoms, and by reason of their influence on the uterine musculature and endometrium causing hemorrhage, and by reason of their degeneration resulting in gangrene, infection, and malignancy. About 3¼% become malignant. According to Bayle, one woman out of every five over thirty years old is afflicted with a uterine myoma. This seems high. More recent statistics, however, show nearly as high a percentage. In one hundred hysterectomies reported by the writer in 1904, 46 were for myomatous growths. It is not unusual for a woman to go years with a myoma of the uterus without being aware of it, and without it causing her any discomfort. On the other hand, a uterine myoma may take on a rapid growth and soon cause alarming symptoms.

Dr. Stephen E. Tracy, in his report of 100 operations for the removal of uterine fibromyomata, gives some interesting statistics. He shows that malignancies in the uterus and in the degenerations of the tumors are more frequent than is generally believed. In his 100 cases there were 31 in which malignancy and degenerative changes had taken place. This corresponds very closely to the writer's experience. Eleven per cent of his cases showed malignant changes. I quote from Tracy's excellent paper the following paragraph:

"The percentage of the malignancies in this series is decidedly larger than usually reported, which shows the fallacy of drawing conclusions from a collective series. In 3561 collected cases reported by the writer in 1908, the condition was present in 4%. In 337 cases reported on by Noble, malignancy was present in seventeen, or 5%. In the last 100 cases he reported malignancy was found in 8%. Bland-Sutton states that malignancy in the corpus uteri will be found in over 10% of the cases in women past the age of 50 who submit to operation. In a series of 500 consecutive cases submitted to operation he found among sixty-three women of 50 years and upward, eight, or 12.7 per cent, who had cancer of the corporal endometrium, as well as fibroids. Geist, in a series of 250 cases of uterine and cervical myomas, found that twelve, or 4.8 per cent, showed sarcomatous changes. Winter believes that if myomas are examined systematically sarcoma will be found in about 4% of all cases. Freund in 500 myoma cases found carcinoma in the uterus or ovary in 6 per cent; Kline in 491 cases found malignancy in 7.7 per cent; and Mackenrodt in 418 cases found malignancy in 7.7 per cent."

Degenerative changes of fibromyomata uteri take place most frequently between the ages of 40 and 50. The writer has found a greater percentage before the age of 40 than after the age of 50 years. Other surgical lesions in the pelvis or abdomen are usually associated with fibromyomas. Tracy reports that in only 19 of his 100 cases were there no associate lesions of the abdominal or pelvic organs, and no change in the tumors of the uterus. In 56 cases there were surgical lesions in

Pelvic Conditions and Female Risks 279

the abdomen or pelvis in addition to the fibromyomas. Deaver reports in a series of 513 cases 111 showed hyaline degeneration, 26 hemorrhagic, necrotic, calcareous or a combination of these. Carcinoma was present in 8 cases. Tuberculosis was noted in one case. Pyosalpinx was found in 14 cases. In 2 there were tuberculous salpingitis, ovarian cysts in 48 cases and in 7 cases there were interligamentary cysts. In the writer's experience about 50% had borne children. The primary surgical mortality in uncomplicated cases is very low, not more than 2% or 3%. Deaver reports 100 consecutive operations without a death. It is the writer's opinion that the menopause tends to increase the growth rather than to diminish it, and is productive of degenerative changes. This is contrary to the common opinion that after the menopause these growths tend to atrophy.

Myomectomy is seldom advisable. Deaver found myomectomy advisable in only 13 out of a series of 250 cases. Myomata are usually multiple. It may be a more serious operation than a hysterectomy. A single myoma is more apt to be large and involve so much of the uterus as to make its removal impossible, and at the same time save a functioning uterus. Myomectomy, is, however, sometimes justifiable in young married women. In three of the writer's cases normal deliveries of healthy babies subsequently occurred.

Heart complications seem to be a direct result of myomatous uterine growths in a large percentage of the cases. Wilson found that in 274 cases of myoma, 46% showed heart complications. Fleck found in 325 myoma cases that 40% showed heart complications. Kisch emphasizes the rôle of anemia in the production of myodegeneration of the heart in connection with myoma of the uterus. Deaver has pointed out that myocarditis and arteriosclerosis are frequently associated with these uterine growths and that pulmonary embolism is frequently a post-operative cause of death. It is the writer's opinion that these growths cause both heart and renal disturbances more frequently than is generally supposed.

It is difficult to speak with any degree of accuracy regarding

280 Twenty-Ninth Annual Meeting

the longevity of women who have undergone operations for the removal of ovarian or uterine tumors. Statistics are insufficient and cannot be relied upon. Each case must be specially considered. Much will depend upon the condition necessitating the operation, the amount of damage done and the promptness and completeness of the recovery. If a malignant change has taken place, the applicant will never be safely insurable. In cases of removal of a simple cyst or an uncomplicated fibroid tumor of the ovaries, that is proven to be non-malignant on microscopical examination, and where the recovery is prompt, I believe the hazard is not materially increased. Where there is no suspicion of malignancy, a complete hysterectomy for the removal of uterine myomata should not affect the risk to a very great extent if the recovery has been without complication. However, in all these cases a postponement of two years from time of operation is advisable.

Following the removal of the uterus, ovaries, or the Fallopian tubes, where there have been severe inflammations, the results are not so favorable and the risk is impaired accordingly. Women who have undergone abdominal section for diseased pelvic conditions should not be considered quite as good risks as women who have always been healthy, even though their recoveries have been complete.

Before accepting a woman for insurance who gives a history of ever having had any pelvic trouble, there should be a very careful examination made of the pelvic organs. Women who have borne children should always be examined for lacerations, displacements, growths and malignant changes. Abnormal discharges are always suspicious and should receive special attention. Could we get careful and complete examinations of women risks, our selection among them would doubtless be as safe as among men.

DISCUSSION

Dr. Jaquith—The discussion will be opened by Dr. W. Evelyn Porter, Medical Director of the Mutual Life Insurance Company.

Dr. Porter—We are greatly indebted to Dr. Beckett for his admirable paper.

The desirability of careful examination of the pelvic organs in female applicants for life insurance is unquestionable. Practically, however, it is impossible to have such examinations made by the company's representatives and we are forced to depend upon statements from attending physicians or specialists, selected by the applicants themselves. Statements to be of real value should invariably come from qualified specialists in good standing. This at once places an added expense on the applicant and, with their natural aversion to such examinations, the majority would refuse outright to submit to them.

Where a history of surgical procedures is given, statements from the operating surgeon should invariably be required and, in fact, the history of any local attention on the part of a physician or surgeon should have similar requirements. In the absence of any such history, I believe the majority of cases can be judged on their individual merits after carefully weighing all features in the personal history given by the applicants.

Dysmenorrhœa, when acknowledged by the applicant, will usually be found to be of sufficient significance to warrant postponement of the risk, for it should be borne in mind that the statements submitted by women in their medical reports are commonly found to be incomplete or incorrect.

Lacerations and conditions immediately following parturition will seldom be acknowledged, but when such histories are given, it is always best to obtain statements from the attending physicians or surgeons as to the past history and present conditions found upon local examination. The chronic inflammatory conditions when found to exist, should result in the declination of the risks.

Each case presenting a history of uterine displacement should be judged individually. Where pessaries are being worn to remedy the conditions, postponement or rejection will be necessary, as the mechanical irritation and pressure resulting from their use will often prove serious. An interesting

282 Twenty-Ninth Annual Meeting

illustration of this fact occurred in a patient who consulted me for extensive pelvic inflammation, where I found that the posterior bar of a pessary had penetrated the posterior vaginal wall and been completely enclosed by new-formed granulation tissue.

Applicants giving a history of abortion should be accepted only after they have subsequently passed through a normal full-term pregnancy and confinement.

The history of benign ovarian growths and chronic inflammatory conditions of the ovaries should be declined until, at least, one year has elapsed from the date of complete recovery. The same would be true of chronic inflammatory conditions of the Fallopian tubes.

The history of ectopic pregnancy excludes, except where both Fallopian tubes have been removed and, at least, two years have elapsed since operation.

Histories of benign growths of the uterus or appendages should result in declination or postponement until two years after removal and complete recovery from operative procedures—statements invariably being required from the operating surgeon.

Where premature menopause results from hysterectomy or double oophorectomy, the nervous disturbance is often so great as to result in actual insanity, so that, at least, two years' postponement should be required.

Any history of malignant disease should decline.

Dr. Beckett has called attention to the absence of subjective symptoms due to ovarian tumor. This is the case in most pelvic growths, even malignant, prior to the development of the conditions due to pressure.

Menorrhagia or metrorrhagia alone gives rise to suspicion of serious trouble in most instances, and with women past the menopause, any history of recurrent bleeding, however slight, should be a cause for adverse action on the part of the Medical Director.

The amount of available statistical data from an insurance standpoint, covering the various impairments outlined in the

paper, is so small as to render scientific discussion along such lines impossible. Dr. Beckett's conclusions, outlined in his final paragraph, are unquestionably correct and pending the accumulation of accurate statistics, women presenting histories of disorders of the pelvic organs, should only be accepted after receiving reports from competent specialists, based upon personal observation and pelvic examination.

Dr. Brown—Mr. President, it may be of interest at this time to present the mortality experience of the Prudential in a small group of risks which have some of the impairments which Dr. Beckett has discussed, namely; those who have undergone hysterectomy or ovariectomy. In this group were included pan-hysterectomies, the removal of the uterus, enucleation of fibroids, and the removal of all or parts of the ovarian tissue. The method of selection was rather crude, as our opinion of the risks was based almost entirely on the applicant's statements. An effort was made to learn the nature of the condition which necessitated the operation; we required the applicant's statement that she had been free from symptoms for a reasonable period, and it was our practice not to accept risks of this character until at least one year had elapsed since operation, but a few which seemed to be exceptionally favorable were taken within less than that time.

There were 861 individuals insured. The exposure extended in some instances to eleven years. The mortality experienced by the whole group was 142% of the Medico-Actuarial experience. Age groups 30 to 34 and 35 to 39 had a mortality of 245% and 247% respectively. There were 17 deaths, and five of these were very closely related, from a historical standpoint, to the impairments under discussion. One died of general peritonitis following the rupture of an ovarian abscess. In this instance, there had been an operation for the drainage of an ovarian abscess two years before. There were three deaths from intestinal obstruction, all attributed to peritoneal adhesions, the operations having occurred five and thirteen years respectively, prior to death. One died during the repair

of a post-operative hernia which had resulted from a double ovariectomy nine years previously. Had it not been for these five deaths, the experience would have been just the expected. Two died from pelvic cancer, the operations having taken place four and nine years prior to death; and there were two deaths from carcinoma of the stomach which probably were not related to the impairment which necessitated the original operation.

In a review of all the applications it was noted that the rejection percentage was about three times what is usually expected in the general run of business. Fourteen per cent of these rejections were on account of pelvic symptoms which the applicant admitted and 16% were rejected because of unsatisfactory moral hazard. The latter feature causes one to feel that extraordinary care should be used in the moral hazard as well as the physical selection of risks of this character.

Dr. Rowley—This Association is deeply indebted to Dr. Beckett for his valuable paper. He has called to mind in a very able and interesting way some pelvic surgical conditions that would ordinarily escape detection in an examination for life insurance—conditions whose influence must, however, make themselves felt in their effect upon mortality.

The results of prominent specialists in this field of surgery have been brought before us by Dr. Beckett in that clear manner that is possible only by one who is himself a master in this branch of surgery.

Dr. Beckett's paper is opportune for it is certain that to-day life insurance is being purchased by a greater number of women than ever before and in consequence of the changed status of women in the business world perhaps we can expect the policies are, or will be, larger in amount. It is important therefore to have our minds directed more and more to the conditions that should influence us in deciding upon the insurability of women risks.

Viewing this subject more strictly from the standpoint of selection for insurance, we must realize that our knowledge of

the presence of these conditions will depend in the majority of instances upon the truthfulness and frankness of the applicant, and inasmuch as the examiner will in most cases be a stranger to the applicant, there is likely to be an obstacle to that much desired frankness. Women have been accused of having a lesser sense of responsibility than men have in business matters and more easily forgive themselves for failing to state the whole truth. I prefer neither to endorse nor to question that view.

It would appear that insurance companies are in danger of being left much in the dark as to the presence or absence of many of the conditions affecting the pelvic organs, and I believe that some relief from this dilemma will be afforded by the more general employment of women examiners for women applicants.

The necessity for pelvic examinations in certain types of cases has been well emphasized by Dr. Beckett and while certain practical difficulties may be encountered I feel that much may be gained by the employment of women examiners.

Women are entering the field of life insurance in all of its branches, and there are capable women examiners, and as companies accustom themselves to the employment of women examiners, I believe the important pelvic conditions will be more generally detected.

Through many sources of information our attention is called to the fact that cancer death rate in the general population is on the increase and while it may, or may not, be true that cancer of the uterus shows a slight decrease, still, as Dr. Beckett has mentioned, cancer of the uterus is the cause of death in over 20% of the total cancer deaths in women.

We are confronted with the importance of being able to discover cancerous and precancerous conditions in women applicants who present themselves for insurance, and the practice of having more frequent pelvic examinations will, no doubt, be of the greatest help.

If it is true that one woman of every five over thirty years old is afflicted with uterine myoma, it would appear, on account

286 Twenty-Ninth Annual Meeting

of the uncertainty as to the future developments, that we are assuming an attitude of unwarranted boldness when we accept for insurance any woman over thirty years old were it not for the fact that only a relatively small percentage of myomas seem to lead to serious and fatal consequences.

It is true that myomas may cause serious trouble without undergoing malignant change, and yet from our standpoint it is perhaps permissible to regard them as precancerous conditions the same as we must regard cervical tears as precancerous conditions.

We can assume that practically all parous women have a cervical tear and perhaps we can assume that a large percentage of nulliparous women have a myoma.

While a careful pelvic examination would help greatly in reaching the wisest decision as to the acceptability of these cases for insurance, we must too often trust to the truthfulness of the statements of the applicant, and in the absence of symptoms we shall probably continue to accept cases presenting these two important precancerous conditions with perhaps a slight resultant increase in mortality.

While I have a certain mental reservation as to the practical applicability of routine pelvic examinations in applicants for insurance, I am in entire accord with Dr. Beckett in his emphasis as to the value of such examinations, and there is no doubt but that a considerable saving in mortality could be effected through their more frequent adoption.

Dr. Jaquith—Dr. Snow has some data which, while it does not altogether relate to this particular subject, has to do with joint lives. I will ask Dr. Snow to present this report.

Dr. Snow—Although not entirely germane to this discussion, I shall be glad to present a synopsis of the experience of my company in a certain class of female risks.

From 1851 until about 1890, we wrote insurance on women without restriction. For about 15 years, we did not offer insurance to married women but, in 1907, we began to issue on joint lives—husband and wife, if there were living minor children. We issued only in small amounts—maximum \$2,500

—as we recognized what we considered to be a reasonable insurable interest and we thought the speculative feature could be eliminated. By rigid inspection and by the selection of what we considered only standard lives, we exercised, as we thought, the most extreme care.

A year ago, we undertook an investigation and discovered the real facts. The figures cover an exposure of 10 years; the amount at risk \$5,630,000. The case percentage is not available but, from the fact that the minimum policy is \$1,000, the maximum \$2,500, this is not important. Briefly, these are the figures:

	Percentage of Com- pany's Normal Experience	Percentage of M. A. Table
Age at entry 18 to 27.....	310%	245%
Age at entry 28 to 32.....	250%	202%
Total all ages.....	207%	166%

The reasons might be elaborated but our conclusion is anti-selection.

Dr. Scadding—Some years ago, when I fancied I knew more about the ladies than I do now, one of the former Presidents of this society said to me in the course of a little informal discussion about the sex, "Doctor, they will beat you every time!" Whether it was the gesture, or the oracular character of the remark, which so impressed me, I do not know, but with regard to female risks my feeling during all these years has been such as to make it difficult to reconcile me to the sex as insurance risks.

In view, however, of the lessons of self reliance and control which women have learned during recent years, in view of the freedom of thought engendered, in view of the fact that they have so splendidly undertaken and accomplished nearly everything that men were alone supposed to do thoroughly, there will undoubtedly be a great increase in the number, and

288 Twenty-Ninth Annual Meeting

I think in the quality, of the risks applying, and it seems to me it is safe to say that the mortality will be lower. In the past it has been higher undoubtedly in their earlier years, and it will perhaps continue so, but I am inclined to take for granted that with the changed outlook of women, they will make a better showing.

The increasing mortality from cancer, of course, is a grave factor to be considered. A few years ago there were eleven to twelve thousand deaths from cancer, and of course there must be large areas outside of the districts reported, so that these figures do not by any means represent the mortality. As to the curability of cancer, there seems to be a great divergence of opinion, some authorities putting it at 60% of those submitting to surgical operation. If we could get skilled examinations, I have no doubt that the mortality would be cut, but we must remember that a large majority of examinations must be made by the rank and file who in a large proportion of cases would not recognize the early appearance of the disease.

However, taking everything into consideration, I am inclined to believe that so far as the general insurability of women is concerned, their mode of life, their better habits, their better morals, counterbalance the risk of undiscovered pelvic impairments. If we could get skillful examinations I would be inclined to go a step further and say that female risks are really better risks.

Dr. Jaquith—Tuberculosis in some form, is the cause of death in a large percentage of the claims presented to all insurance companies. Believing all would be interested in a contribution on this subject, Dr. Bartlett's offer to prepare a paper on the "Insurability of the Tuberculous" was gladly accepted.

Insurability of the Tuberculous 289

THE INSURABILITY OF THE TUBERCULOUS.

BY WILLIAM BRADFORD BARTLETT, M.D.

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It might at first thought be considered as a waste of time to discuss the Insurability of the Tuberculous, for the idea which at once comes to mind is the absurdity of even considering such individuals as risks suitable for life insurance.

When, however, the newer theories of tuberculous infection are considered, it at once becomes apparent that such an idea is far from absurd. Indeed, it becomes evident at once that, if we did not insure those infected with tuberculosis, we should do little or no business. A review of these recent theories is first in order.

It is now generally conceded that nearly all tuberculous infection is contracted in childhood. In our present civilization the tubercle bacillus is ubiquitous. Experience with the Von Pirquet skin tuberculin test has shown that over 87% of all children become infected with tuberculosis and sensitive to tuberculin before the fifteenth year. On the other hand, other figures show that only 24% of all individuals develop tuberculosis. Thus, in fully 63% the infection remains permanently latent, while the subjects are apparently healthy,—that is, they have anatomic tubercle but they do not exhibit clinical tuberculosis. If once infected, they carry tubercle bacilli to their dying day even though living to extreme old age, for "a tuberculosis cure is a cure of symptoms and an arrest of the tuberculous process. It is probably never a complete obliteration of the offending lesions nor a complete sterilization of the infected tissues (1)." Of the few children who present evidence of tuberculous infection a small per cent develop pulmonary lesions, meningitis or miliary tuberculosis and die; a larger per cent develop tuberculous adenitis; bone or joint tuberculosis and recover. If a deep-seated gland is involved, the condition is often unrecognized; if a surface

290 Twenty-Ninth Annual Meeting

gland, the scar remains to affright some future life insurance examiner.

Passing from childhood into adolescent and adult life, the non-pulmonary forms of tuberculosis become less and less frequent and the pulmonary form is the type most frequently met with.

From this brief review it becomes evident that a large proportion of the population carry a tuberculous infection acquired in childhood through a long lifetime without evidence of clinical tuberculosis. Such are accepted without question for life insurance. A small per cent develop clinical tuberculosis; these differ from the former group only quantitatively. While in the active stage of the disease, they are of course not insurable; if they recover, do they ever fall back into the former group and become again insurable? It is this question I shall attempt to answer.

Let us, for convenience, divide our subject into three general headings:

- I. Pulmonary Tuberculosis.
- II. Non-Pulmonary Tuberculosis.
- III. Certain Diseases Associated with Tuberculosis.

I. PULMONARY TUBERCULOSIS. Lung lesions often never become large enough to give symptoms of disease, as the many healed lesions found at autopsy in persons who have never given a history of tuberculosis bear witness. When, however, definite symptoms are once established we are dealing with a serious condition. Krause (1) says: "It is questionable whether any anatomical process which has been extensive enough to cause clinical symptoms is ever completely healed. . . . In most people who have once had clinical pulmonary disease, single or successive eruptions from the old once-arrested focus take place and illness again manifests itself."

The earlier the disease is recognized and the longer it is treated, the better are the results, both immediate and ultimate. Cases of pulmonary tuberculosis in which bacilli are never found do much better than the open cases. The open

case which becomes free from bacilli during treatment offers a much better prognosis than the case retaining bacilli. The occurrence of hemoptysis has recently been shown to render the prognosis less favorable in both the closed and open case (2).

Several Sanatoria have made great effort to keep in touch with their discharged patients and there have been many statistics published on the ultimate results of sanatorium treatment. The most complete study is that made by Lawra-son Brown of Saranac Lake (3). He made a study of the percentages of the living and dead among the discharged patients of the Adirondack Cottage Sanitarium. He found that the patients discharged apparently arrested have a death rate, at first *twice*, later *three* times that of the general population—a figure which is reduced after eight or ten years to about the general average. The patients discharged with disease quiescent show a death rate at first of about *five* times, rising in the third year to about *ten* times that of the general death rate. Thereafter falling somewhat. The death rate of patients discharged with disease still active is at first as high as *forty* times the general death rate, but rapidly decreases, although as long after as ten to seventeen years it remains from six to seven times the expected. The table illustrates these figures, and is copied from Dr. Brown's paper. Similar results obtained by King at the Loomis Sanatorium and by several other investigators show plainly that one who has once had clinical pulmonary tuberculosis is not insurable thereafter. It might perhaps be possible to give insurance to an applicant who had had his disease apparently arrested (formerly designated apparently cured) and had gone for eight or ten years without symptoms. In this respect, however, the following paragraph in a personal letter from Herbert Maxon King, written not long before his death, is of interest:

"The longer we live with tuberculosis, the less inclined we are, I think, to consider the most perfectly arrested case *ever* to attain a par with the normal individual, and, from an actuarial point of view, I doubt if any individual who has once had frank tuberculosis can ever be considered a normal risk."

292 Twenty-Ninth Annual Meeting

But in placing this form of tuberculosis outside the benefit of life insurance, I wish to make a plea for the unfortunate individual who is sent in error to the health resort or sanatorium. I have many times seen the diagnosis of tuberculosis made on the scantiest evidence and the patient sent to a sanatorium. Such a case improves rapidly and after a few weeks or months of treatment comes home "cured." If an applicant gives a history of a short sojourn in one of the well-known resorts for the tuberculous, we are too apt to throw the case out without further consideration. All the Sanatoria and nearly all the physicians at these health resorts keep full and complete records and are only too glad to assist a former patient in obtaining insurance by giving the facts to the company. In justice to these unfortunate individuals, the victims often of a false diagnosis, let us give these cases the thorough investigation they deserve.

II. NON-PULMONARY TUBERCULOSIS. The non-pulmonary forms of tuberculosis differ greatly from the pulmonary form. These forms of tuberculous disease are most frequently met with in childhood; with a few exceptions are rarely fatal, and, therefore, are continually appearing in the histories of applicants for life insurance. They may be divided for our consideration into two main divisions; those manifestly uninsurable at any time and those possibly insurable after a certain period of complete cure.

I. UNINSURABLE

A. Certain forms of tuberculosis are progressive from the start and result in the death of the patient in a longer or shorter period of time. Miliary tuberculosis and tuberculous meningitis run their course in a few weeks or months. Tuberculosis of the adrenal gland which gives rise to that rare affection known as Addison's Disease, is more chronic, a typical case lasting from two to four years. Still more chronic is Lupus, which goes on for many years, but is never completely cured.

B. For the sake of completeness, it is well to mention several forms of tuberculosis which are rarely or never primary, but often accompany and complicate advanced pulmonary disease and are evidence of a widespread and progressive tuberculous infection and low resistance of the host. Of such nature are tuberculosis of the lips, tongue, tonsils, thyroid, oesophagus, stomach, liver, pancreas, and spleen. Primary tuberculous ulcers of the lips, tongue, and tonsils have been reported, but such cases are very rare and of no practical interest. Several cases of primary tuberculosis of the spleen are on record that have been cured by splenectomy—however, such an individual could never be considered as insurable.

Tuberculous laryngitis is very rarely primary, but usually secondary to pulmonary disease. Cure is unknown, although in pulmonary cases that become arrested the laryngeal disease may undergo cicatricial repair and remain quiescent for some years.

Tuberculous enteritis is another much feared complication of advanced pulmonary disease and its advent usually marks the last chapter in the patient's history. In children, primary tuberculous enteritis occurs and is always fatal and of short duration.

C. Urinary Tuberculosis. This form is usually not secondary to pulmonary disease, although in six to ten per cent of the cases it may accompany phthisis.

It is well to remember that tuberculosis of the urinary tract starts in the kidney and spreads downward, infecting first the ureter, then the bladder. It is now generally agreed that the only cure for this disease is the removal of the infected kidney, when it is often surprising how quickly the ureter and bladder will heal. An applicant with only one kidney presents an impairment of such a nature as to debar him from Life Insurance, at least at normal rates.

It will be seen that all the forms of tuberculosis mentioned above render an applicant uninsurable:—In fact we are not apt to meet any of these conditions, except urinary tuberculosis, in our work, since the individuals suffering from the other

294 Twenty-Ninth Annual Meeting

forms are too ill to be presented for insurance. Of different type are the forms of tuberculosis to be considered in Group II.

II. POSSIBLY INSURABLE

I. *Tuberculous peritonitis* is always secondary to tuberculosis of some organ or structure in the abdomen. When the disease accompanies a general lymphatic involvement or is complicated with tuberculous enteritis, the outlook is very unfavorable. The most favorable cases are those which arise from some local tuberculous focus which can be removed at operation. Mayo (4), in a recent article, states that in tuberculous peritonitis which is the result of tubal tuberculosis the removal of the Fallopian tubes may be expected to cure, unless other incurable tuberculous lesions co-exist. A peritonitis secondary to tuberculosis of the iliocecal coil or to localized tuberculosis of the small intestine may become cured after removal of the diseased bowel, but such an individual would hardly be considered a good risk for Life Insurance.

When no source of infection is discoverable, the outlook is unfavorable. Some cases appear to be cured by simple laparotomy; others make a spontaneous cure. If, however, these cases are followed, it will be found that many relapse or show evidence of tuberculosis elsewhere. The outlook is somewhat better in childhood than in adult life.

II. Tuberculous disease of the *genital tract* in the female is usually confined to the Fallopian tubes and has been considered above. The large number of complete and lasting cures after removal of the diseased tubes argues very strongly for the primary origin of this form of tuberculosis; and I see no reason why an applicant giving a history of a successful operation for cure of this condition would not be acceptable for insurance after a lapse of eight or ten years with freedom from recurrence. It is a disputed fact whether tuberculosis of the male genital tract commences in the epididymis or prostate. It is usually primary and not associated with tuberculosis elsewhere. The seminal vesicles become infected early in two thirds of the

Insurability of the Tuberculous 295

cases. After the removal of the infected testicle or of the epididymis the prostatic lesion usually disappears. The outlook for these cases where early operation is performed is excellent, both as to immediate and ultimate cure, and this history should not debar an applicant from insurance after a reasonable time has elapsed.

III. Most frequently met with in applicants for insurance is a history of tuberculosis of the *bone, joints, or glands*. These diseases are frequent in childhood and usually are followed by complete cure. It is the custom of most insurance companies to offer insurance freely to these applicants. Are they justified in so doing?

I hoped to be able to answer this question by some statistics bearing on the subsequent history of these cases, but search has revealed very little on this subject.

Most tuberculosis specialists agree that it is unusual to find pulmonary tuberculosis in individuals who have suffered from tuberculosis of the bones or joints in early life. A large per cent of these bone and joint cases are due to the bovine type of bacillus and this type shows very little tendency to produce pulmonary disease. Indeed, many authorities go so far as to say that infection with bovine tuberculosis increases the immunity of the individual, thus rendering him less liable to later pulmonary infection.

Though operation is usually followed by cure in bone tuberculosis, when the joint is involved the treatment is more difficult, and must be prolonged. The larger the joint involved the more serious is the outlook. Recurrence following an operation usually occurs inside of two years; and miliary tuberculosis or tuberculous meningitis, the two most dreaded complications, usually occur within a few days or weeks of operation.

In 1884 Mayfair enunciated his law that a person who had suffered from scrofula in childhood and had completely recovered from it would never contract pulmonary tuberculosis. This law, unfortunately, is by no means dogmatic, but it coincides with the general impression of many students of

296 Twenty-Ninth Annual Meeting

tuberculosis. The Medico-Actuarial investigation showed that the death rate from pulmonary tuberculosis among those giving a history of tuberculous glands in the past was no higher than the normal.

Glandular tuberculosis is most frequent in children. The retro-peritoneal, mediastinal, and cervical groups of glands all may be involved and appear to derive their infection from different sources. From 75 to 90% of glandular infections are of the bovine type.

When the retro-peritoneal glands are widely involved, we have that severe and fatal disease of childhood known as *tabes mesenterica*. Occasionally only the mesenteric glands in the ileocecal angle are involved. The symptoms then resemble those of appendicitis and the diagnosis is usually impossible before opening the abdomen. Homer Gage (5) reports excellent results after the removal of these glands. He considers this form of tuberculosis quite common and shows that it is usually a primary infection.

Tuberculosis of the mediastinal glands is probably frequently present but is rarely recognized and so possesses little interest from the insurance standpoint.

Cervical adenitis is the most common form of glandular tuberculosis and probably the most frequent form of extra-pulmonary tuberculosis. It shows a strong tendency toward healing and chronicity. Dowd (6) reported on the after results in fifty-four patients observed for periods of from five to thirteen and a half years after operation and found fifty-three were cured. He states that this "very satisfactory condition indicates that those who have passed five years in good health since their operation need have little fear of serious recurrence." He believes the operation for removal of tuberculous glands to be one of the most satisfactory of surgical procedures. In a later investigation (7) he found that of 452 cases operated on while the disease was still a local process, 91% remained well and free from recurrence. Not a single case developed pulmonary disease.

From such scant data as I have been able to collect, it seems

as if we were fully justified to accept freely applicants for insurance who give a history of glandular tuberculosis in childhood; whether the cure be operative or spontaneous. The same may be said of bone and joint tuberculosis, with the exception of Potts's disease. If the deformity resulting from this disease is marked the case is unsuitable for insurance, because of the unfavorable effect of the deformity on the thoracic and abdominal organs. If, however, treatment is properly and thoroughly carried out, the deformity is slight or nil and I see no reason for discriminating against such a case. The unfavorable cases are those with recurrent disease, the infection attacking one chain of glands, then another; then a small bone, then perhaps a joint. These cases show deficient resistance and offer a bad prognosis.

IV. There remain for our consideration certain diseases and symptoms which are common complications of pulmonary tuberculosis and also frequently occur independently—I refer to pleurisy, hemoptysis, and anal fistula.

A. PLEURISY

Dry pleurisy, pleurisy with effusion and empyema are all stages in the same pathological process, the form of pleurisy depending on the nature of the infection and the resistance of the organism. Certain infections tend to cause certain forms of pleurisy; thus the pneumococcus produces a turbid fluid or a pus formation (empyema), while the tubercle bacillus produces a clear fluid or a fibrinous pleuritis with little tendency to pus formation.

Pleurisies should be divided into two groups:

1. Idiopathic pleurisy—so called—that is, the pleurisy which comes on in a previously healthy individual without apparent cause and is usually attributed to "catching cold."

2. Pleurisy secondary to:

- (a) Some lung condition known to be already existing; as pneumonia, bronchiectasis, infarct, or pulmonary tuberculosis.

- (b) General infection—that is, rheumatism, diphtheria, typhoid fever, etc.

298 Twenty-Ninth Annual Meeting

(c) Some asthenic condition of the body.

Idiopathic pleurisy:

A very large proportion of idiopathic pleurisies, dry or wet, are undoubtedly due to infection with the tubercle bacillus, although many times it is impossible to prove such to be the case. Landouzy claims that 98% are due to tubercle, while other writers make lower estimates. Lord (8) believes three fourths are tuberculous and states that out of every ten cases of primary fibrinous or serofibrinous pleurisy at least three or four develop tuberculosis within an average period of four to six years.

Of more importance is the after history of pleurisy cases. This has been investigated by a number of observers, whose figures, on the whole, agree that from 30 to 40% ultimately develop or die from tuberculosis.

Allard and Koster (9) studied a large number of cases of pleurisy and believe that, in at least half the cases, tuberculosis may be counted on to follow within five years as a rule; but under the age of fifteen tuberculosis follows much more rarely. When, however, the pleurisy develops as a complication of an acute infectious disease or other non-tuberculous affection, tuberculosis follows only exceptionally.

Sears (10) in an investigation made at the Boston City Hospital, found that of the cases which developed tuberculosis, 50% developed it within five years and 70% within ten years. He and Cabot found tuberculosis twice as frequently in patients who gave a history of tuberculosis in the family.

The Medico-Actuarial investigation shows the same facts. If pleurisy occurred within five years of application the relative mortality in first five policy years was higher than in succeeding years and was also distinctly higher at the younger than at the older ages at entry. Death rate from tuberculosis of lungs was three times the normal.

When pleurisy occurred between five and ten years prior to application, the tuberculosis death rate was twice the normal and the mortality still quite unfavorable. When the attack

occurred ten years and more prior to application, the mortality was favorable and the tuberculosis death rate normal.

Practically the same facts hold good for dry pleurisy as for wet pleurisy. Lord followed sixty cases and found 30% developed tuberculosis. He believes that dry pleurisy is as liable to be followed by tuberculosis as wet pleurisy. Von Ruck shares this belief.

Empyema, however, is very different. It is almost always secondary and very rarely due to the tubercle bacillus; the pneumococcus and streptococcus being the usual causative agent and the condition following pneumonia, lung abscess, or trauma in the vast majority of cases. In the rare cases in which empyema appears to be primary or "idiopathic" and in which the staphylococcus is found, tuberculosis should be suspected.

From the above facts I believe the following method of treating an applicant giving a history of pleurisy is indicated:

First, as complete a history as possible of the attack should be obtained.

Second, if the pleurisy follows pneumonia or accompanies some other acute infection, the risk need not be considered impaired.

Third, if the pleurisy is primary,—the so-called idiopathic pleurisy,—a postponement of ten years from the time of the attack is indicated before the applicant can be considered a standard risk; although in applicants over thirty-five years of age, a five-year postponement might be sufficient if other conditions were very favorable; the family history of the applicant and his build being of course important factors in weighing the risk. In this respect I believe a *definite* history of dry pleurisy should be as seriously considered as wet pleurisy, always remembering that many trivial attacks of pain in the chest of a few days' duration are often called pleurisy.

Fourth, an empyema, following a pneumonia with prompt recovery on incision and drainage, does not impair the risk provided the lung expansion is found to be normal and no deformity of the chest exists. Empyema, giving a history of

300 Twenty-Ninth Annual Meeting

long discharge or persisting sinus; or where marked deformity of the chest follows, renders the risk uninsurable.

B. HEMOPTYSIS

The term hemoptysis is a general one and includes all forms of blood spitting, whatever their source or cause. The blood may come from the nose, mouth, pharynx, larynx, trachea, bronchi, or lungs. In nose bleed the blood may be drawn or run back into the throat and give rise to considerable blood spitting; blood streaked sputum may be met with in ulcer or perforation of the nasal septum, in chronic nasal catarrh, or in follicular pharyngitis and pharyngeal ulcer. Spongy or bleeding gums may give rise to the spitting of blood in small amounts and may even suggest a diagnosis of tuberculosis. Enlarged veins at the back of the tongue, a varix of the lingual tonsil, is a rare source of bloody sputum.

Hemorrhage from the *larynx* may occur in syphilis, tuberculosis, or cancer of that organ; may be the result of lodgment of a foreign body or may occur in small amounts after severe coughing in acute laryngitis.

Hemorrhage from the *trachea* or *bronchi* may occur from the impaction of a foreign body or may be due to ulceration resulting from syphilis, or pressure from tumors or aneurism.

All these minor causes of blood spitting must be borne in mind when considering an applicant who gives a history of hemoptysis; for the appearance of even small amounts of blood in the sputum often causes such terror to the individual as to make a very lasting impression and one out of all proportion to the seriousness of the condition causing it.

Passing now to a consideration of *broncho-pulmonary* hemoptysis we find the causes of this symptom may be divided into four groups:

I. Constitutional Disease

In certain constitutional or blood diseases hemoptysis may occur as merely another manifestation of the general tendency

Insurability of the Tuberculous 301

to bleed. Thus in purpura, hemophilia, severe jaundice, leukæmia, severe anæmia and the hemorrhagic forms of the exanthemata and typhoid fever, hemoptysis may rarely occur.

II. Heart and Circulatory Disease

Any valvular heart disease which has progressed far enough to produce engorgement of the lungs may give rise to blood spitting. It is most common in mitral stenosis and is also frequent in mitral regurgitation.

Embolism and infarct, if not immediately fatal, may give rise to repeated hemorrhage or may cause bloody or rusty sputum.

III. Bronchial and Pulmonary Disease

The hemoptysis of pulmonary tuberculosis varies somewhat with the stage of the disease. In the early stage the bleeding is small in amount and the blood bright red in color. In severe advanced cases the bleeding may be copious, is dark red, and often clotted.

Hemoptysis may occur in pulmonary diseases other than tuberculosis. It is not rare in bronchiectasis, abscess, gangrene, and actinomycosis. It may also occur in fibrinous or fetid bronchitis and is a frequent symptom in cancer of the lung or pleura.

A brisk hemoptysis may be the initial symptom of lobar pneumonia and the rusty sputum of this disease is pathognomonic. The occurrence of bloody sputum in delayed resolution of pneumonia has been reported in patients who did not later develop phthisis; such an occurrence, however, would be a very suspicious indication that one was dealing with a pneumonia of tuberculous origin.

Streaked sputum occurs in acute bronchitis and in severe paroxysms of asthma, especially if associated with cardiac disease. Chronic bronchitis and emphysema and the chronic type of influenza may be associated with blood spitting through the development of small bronchiectatic cavities, small abscesses, or interstitial pneumonia.

IV. *Miscellaneous*

This last group includes several causes of hemoptysis of considerable interest to the insurance examiner. Injury to the chest or lung may be followed by hemoptysis. Unless, however, there is a definite injury to lung tissue, as from a punctured wound, broken rib perforating the lung, violent or crushing injury and the like, the occurrence of hemoptysis following trauma should be considered as very suspicious of an underlying tuberculous process. Of 379 such cases, 74.4% were tuberculous.

Vicarious menstruation is mentioned in all text-books as a possible cause of hemoptysis, but most authorities on tuberculosis do not admit that it can occur in normal lungs.

Hemoptysis may come on without warning in young and healthy persons and pass off without the development of signs or further symptoms of tuberculosis. Such cases are not uncommon. Are we to consider all such hemoptyses as the result of tuberculous infection? An investigation of this subject has been made by Lord (11). Among the cases coming to autopsy at the Massachusetts General Hospital he found fifteen who some time during their lives had a pulmonary hemorrhage, neither followed nor preceded by other symptoms of tuberculosis. In fourteen of these cases evidence of former pulmonary tuberculosis was found at autopsy. In the remaining case the cause of the hemoptysis was found to be syphilis. On the strength of this evidence, it seems wisest to consider all such cases of hemoptysis as due to an existing tuberculosis and the frequency of healed and unsuspected tuberculous lesions in the lungs at autopsy furnishes another argument for this conclusion. An additional argument is furnished by the Medico-Actuarial investigations, Class 14—Blood Spitting without a Distinct History of Tuberculosis of the Lungs. Where the attacks occurred *within five years* of application, the deaths from tuberculosis were fully *five times* the normal. When the hemoptysis occurred between *five and ten years* prior to application, the death rate from pulmonary tuberculosis

Insurability of the Tuberculous 303

was about *three times* the normal. When the hemoptysis occurred *more than ten years* prior to application, the unfavorable effect on the actual to expected death rate seems to have worn off, but even here the death rate from pulmonary tuberculosis is *nearly twice* the normal. In all these groups, the greatest care was undoubtedly used in selecting the risks to exclude those of light build or with unfavorable family or personal history.

From this review of the causes of hemoptysis, it becomes apparent that a symptom which often indicates consumption may be due to lung cancer, aneurysm, abscess, or gangrene; and is not infrequent in heart disease, is of great importance to the insurance examiner. We must not, however, lose sight of the fact that the spitting of blood is often a fearful symptom to the patient and may become much exaggerated both in importance and amount. Therefore, in all cases of doubt a careful history must be obtained, if injustice to both the applicant and the company is to be avoided. We must not forget that hemoptysis in considerable amounts is common in the early days of a lobar pneumonia and that streaked sputum may occur in acute bronchitis, laryngitis, and pharyngitis as well as result from minor local conditions in the nose and throat. If, however, these minor causes of hemoptysis are ruled out, then we must realize that we are dealing with a serious impairment. It is my belief that no case giving a history of indisputable pulmonary hemorrhage should be considered as insurable at normal rates for ten years after the last attack. Even then, the cases must be selected with great care.

C. FISTULA IN ANO

This condition is not infrequently found associated with pulmonary tuberculosis. In such cases, the fistula is usually tuberculous, as shown by its chronicity and failure to heal readily after operation. Such cases are of no interest to us from an insurance standpoint, as their pulmonary condition debars them. It is the applicant who gives a history of fistula

without other complications who interests us. In some of these cases, the etiology is apparent. A history of local injury may precede the fistula; a fish bone has been known to pierce the rectum, cause a perirectal abscess, and fistula result. In other cases, the etiology is not apparent, and the question rises as to how many such are tuberculous or associated with tuberculosis elsewhere in the body. Stone (12), in a recent article on this subject, gives a complete review of the literature. The opinions of the writers quoted by Stone differ greatly. Thus, Melcheior believes that at least 61% of fistulæ are tuberculous, whereas Elting in a more recent investigation considers that not more than 10% are due to tubercle, and a great majority of these are secondary to demonstrable tuberculosis elsewhere in the body, usually in the lungs. Bach says: "I do not believe that the tubercle bacillus is responsible for more than five per cent of all cases."

Stone's conclusions are as follows:

1. It is probable that definite tuberculosis cannot be demonstrated in more than 10 per cent of all fistulæ.
2. In a much larger percentage there is some relationship between fistula and tuberculosis and in perhaps 15 to 30 per cent of all cases this relationship is fundamental and not merely incidental. Various theories have been advanced to explain the relationship, but none have been proved.

The Medico-Actuarial investigation bears out the above conclusions. The figures are as follows:

	<i>Ratio of Actual to be Expected Deaths</i>
One attack within 2 years of application	120%
One attack between 2 and 5 yrs. prior to app.	136%
One attack between 2 and 10 yrs. prior to app.	100%

The death rate from tuberculosis of the lungs was several times the normal. Further investigation as regards the relationship between underweight and fistula showed a ratio of 134% actual to be expected deaths and nearly one half the deaths were due to tuberculosis.

Insurability of the Tuberculous 305

Considering the above evidence, how shall we treat an applicant for insurance giving a history of fistula? If five years have elapsed and the applicant gives a clean bill of health, the fistula may be ignored. If within five years, a careful history of the case, duration, and nature of the fistula should be obtained. Given a chronic type of fistula not healing readily after operation and especially if in a lightweight applicant with a tuberculous family history, the case should be postponed until at least five years from date of cure.

If, on the other hand, it is evident from the history that the fistula followed an acute abscess and healed readily after proper treatment, then we may ignore the fistula, especially in an applicant of good build and with a good family and personal record.

Applicants giving a history of recurrent fistulae or in whom suspicious pulmonary symptoms have accompanied or followed the fistula should be considered with great care and rejected unless a considerable time has elapsed with freedom from symptoms.

No risk with fistula at the time of application is suitable for insurance.

REFERENCES

1. KRAUSE, ALLEN K. "Elementary Concepts of Tuberculosis." *American Review of Tuberculosis*, April, 1918.
2. HEISE, FRED H. "Prognosis in Tuberculosis, etc." *American Review of Tuberculosis*, July, 1917.
3. BROWN, LAWRASON. "Ultimate Results of Sanatorium Treatment." *Sixth International Congress of Tuberculosis*, 1908, vol. i., page 927.
4. MAYO, W. T. "Secondary Tuberculous Peritonitis: Its Cause and Cure." *Journal of Am. Med. Assn.*, July 6, 1918.
5. GAGE, HOMER. "Acute Tubercular Inflammation of the Ileocolic Glands Simulating Appendicitis." *Boston Med. and Surg. Journal*, Aug. 26, 1915.
6. DOWD, CHAS. N. "Tuberculosis of the Cervical Lymphnodes." *Sixth International Congress of Tuberculosis* (1908), vol. ii., page 54.
7. DOWD, CHAS. N. *Idem.* *Journal of American Med. Assn.*, July 12, 1916.
8. LORD, F. T. "Fibrinous Pleuritis." *Boston Med. and Surg. Journal*, 1909, vol. clx., page 469.

306 Twenty-Ninth Annual Meeting

9. ALLARD AND KOSTER. "Tuberculosis after Pleurisy." *Hygieia*, October, 1911.
10. SEARS, G. G. "Prognosis of Idiopathic Pleurisy." *Boston Med. and Surg. Journal*, Feb. 25, 1904.
11. LORD, F. T. "Diagnostic Bearing of Certain Pulmonary Conditions." *Boston Med. and Surg. Journal*, Oct. 21, 1909.
12. STONE, HARVEY B. "The Relation of Fistula in Ano to Tubercle Infection." *American Review of Tuberculosis*, Nov., 1917.

Dr. Jaquith—I will ask Dr. Oscar H. Rogers to open the discussion.

DISCUSSION

Dr. Rogers—I have read Dr. Bartlett's paper with a good deal of interest. I do not agree with his use in the field of life insurance of authorities in the treatment of tuberculosis. Indeed, I am coming more and more to believe that the only people who are able to speak *ex cathedra* on life insurance subjects are life insurance people. Take Dr. Bartlett's use of Dr. Lawrason Brown's experience with the graduates of the Adirondack Sanitarium. I do not know of a person whose expert opinion on a case of tuberculosis I should prefer to that of Dr. Lawrason Brown; but when we attempt to transpose Dr. Lawrason Brown's results into life insurance terms, we are confronted with a very great difficulty. I believe that one of the fundamental factors in the value of a tuberculous subject as a life insurance risk is the factor of weight. If a risk of that kind is from 15 to 20% overweight, you can be quite indulgent towards a history of pulmonary tuberculosis. If on the other hand, a risk presenting that history is of lightweight, the prognosis is very serious; so that, when Dr. Bartlett speaks of a mortality at first twice, and later three times that of the general population, I should like to know the weights of the people under consideration. If they were overweight people I should be very much surprised with these mortality ratios. If they were underweight people, it goes without saying that you would get a mortality of two or three times the normal.

We have the best measure of the significance of tuberculosis

among otherwise carefully selected risks in the M.-A. class—"Hemoptysis Without Lung Signs." I do not mean to say that it is a real index of what occurs, but I think it comes as near as anything that has so far been published. It certainly is on all fours with the experience of the New York Life in dealing with risks of that sort. The class to which I am referring, Class XVI of the Medico-Actuarial, were clearly cases of hemoptysis. Taking them, altogether, up to a period of ten years after the event, the M.-A. was 190%; and it was 120% after that time. I think that anyone who looks on pulmonary tuberculosis with indulgence in the face of those figures is making a good deal of a mistake.

Glandular tuberculosis, Class XV, showed a mortality in the first ten years of 178%; and after that, 113%.

It should be remembered that the risks which constituted those groups have been selected with a great deal of care. Undoubtedly, a great many lightweights were excluded from the group, and still enough of them were received into it to increase substantially the mortality.

With regard to Pleurisy, Class XXIII, of the M.-A., there is a good deal of light on the subject. This contains all of the pleurisies, excepting the purulent. Up to five years after the attack, the mortality was 145%; between five and ten years after the attack, 115%; over ten years, the mortality was 92%. There is only one conclusion to draw from these ratios, and that is, that Pleurisy among overweights amounts to comparatively little; among underweights, it amounts to a good deal, very much more than the ratios themselves indicate, because those ratios rest upon a mixture of persons of average build, with a fair intrusion of persons over and under weight.

With regard then to a good deal of this subject under discussion, we already have in the Medico-Actuarial as trustworthy a guide as we can find at the present time anywhere, and a good deal better guide than we can get from any sanitarium records, or from any of the clinical experts in such matters.

In speaking of the M.-A., Class XIV, the doctor says:

308 Twenty-Ninth Annual Meeting

"Where the attack occurred within five years, the deaths from tuberculosis were fully five times the normal; when the hemoptysis occurred between five and ten years ago, the mortality was about three times the normal; and when it occurred more than ten years ago, it was nearly twice the normal." I am afraid of this intruding into the discussion the question of deaths from tuberculosis. I doubt that it is important to us to know whether they die of tuberculosis. They die, and the company pays the claim—that is the real point. It is well enough to consider causes of death as perhaps suggestive one way or another, but I distrust any attempt to lay very great emphasis upon it.

The same thing is true with regard to fistula. The Medico-Actuarial Investigation shows rather favorable figures with regard to fistula: One attack within two years, 120%; one attack between two and five years, 136%; one attack between five and ten years, 100%. The unevenness of the testimony there may be due to paucity of numbers. The figures, theoretically at least, should be reversed. Those of you who have studied the Medico-Actuarial Investigation will recall that the element of weight was emphasized by the committee, and there the extra mortality that occurred in the overweight group was due entirely to the overweight. The extra mortality in the underweight group was probably due to the tubercular tendency, and that is suggested by the combination of fistula and lightweight. If you have a fistula in a lightweight, you probably have a tubercular infection or a tubercular tendency; if you have a fistula in an overweight you have not anything of that kind. Of course average build people with fistula are nothing in the world but a compromise between those extremes.

With regard to empyema, I think the evidence we have is that empyema is not as a rule a tubercular lesion. It means nothing more than infection from a pus-forming bacillus, and when recovery has taken place and the lung is not crippled, the empyema subject is, I believe, about as good a risk as any other. If the lung is badly crippled, you have to deal with a person

whose respiratory apparatus is mechanically crippled, and one man's opinion of the value of the risk is about as good as another's. But taking empyemas that have recovered and are not deformed, I believe that the mortality among them, after they have completely recovered, will correspond very well with the mortality among any other group of lung lesions, aside from the tuberculous.

It is a very interesting paper. I believe that the Medico-Actuarial Investigation contains more of real value in connection with that entire subject than any studies that any clinical expert may give us.

Dr. Kanouse—Dr. Bartlett has so completely covered his subject that it is difficult to add anything of interest regarding it.

Literature dealing with the prognosis of tuberculosis has had so little contributed to it by the statistician, the actuary, or the medical director that I hesitate to express myself on the insurability of this class of risks, other than the non-pulmonary tuberculous cases.

However, not infrequently we have submitted applications on lives of individuals who relate a history of pulmonary tuberculosis. Are we justified in declining these risks without due consideration? Can we offer them some form of insurance?

Because of the many factors pertaining to the individual which have a recognized influence on the prognosis of the disease which includes the age, family history, occupation, temperament, disposition, intelligence, financial condition, and social environment of the patient, it is hardly conceivable that we could compile records that would influence us to consider these risks to be insurable as a class. It is contended, therefore, that these cases must be treated individually.

The clinician tells us that in certain instances the disease can be arrested; that the symptoms will disappear, as will the bacterial evidence of the disease, and that the patient will again be able to earn a livelihood.

From sanatoria reports we learn that permanent recovery may be looked for in from 70% to 80% of the cases of early

pulmonary tuberculosis and from 40% to 60% of the moderately advanced cases, depending principally upon the severity of the morbid process and the degree of the resistance and recuperative power of the individual patient.

It is a difficult matter for us to decide in which of these classes to place a given case, but if the history indicates that the disease was diagnosed early, that the constitutional symptoms were not pronounced, that hemoptysis did not occur, and the physical examination shows no evidence of the disease being active, and that the process hardly advanced beyond the stage of detection, it would seem that we could be reasonably sure that the case did not advance beyond the incipient stage, and we could, after a period of ten years, offer insurance at advanced rates to those individuals showing a favorable family history and normal recuperative and resisting powers, the severity of the rating depending upon the proximity of the date of application to the time of the activity of the disease.

Possibly, in excluding the history of hemoptysis from these conditions favoring the prognosis of this disease, I am placing too much significance on this symptom, for various writers contend that the appearance of blood in the sputum, in small quantities, does not necessarily have an unfavorable bearing on the prognosis. Elderton and Perry, however, in their investigation of this feature of the disease, found that patients who have had hemoptysis have a slightly heavier mortality than those who have not, the ratio being $1\frac{1}{2}$ to 1.

In considering this subject, I have assumed that the tubercular bacilli had been found in the sputum, but in limited numbers, and that they promptly disappeared with the abatement of the symptoms. It has been clearly shown that the mortality is about twice as high in those cases showing a positive sputum as in those in whose sputum no tubercular bacilli were demonstrable. But, in spite of this increase in hazard I do not think that we would be warranted in declining these cases, if, in other respects, their histories were favorable.

Dr. Knight—Mr. President, this discussion has already been carried on very thoroughly, and quite conclusively, for the

most part by Dr. Rogers, but it does seem to me that Dr. Bartlett's paper exhibits a knowledge of the practical problems of medical selection of standard risks for life insurance, coupled with a very great knowledge of the life history and of the resulting mortality effects of the various forms and types of tuberculosis. The authorities upon whom he has depended for his statements of fact about tuberculosis are unquestionably the best of our time.

The writings of Dr. Allen K. Krause are the most prolific, entertaining, and illuminating, and his declarations are accepted all over the country as authoritative, as well as at Johns Hopkins and at Saranac. Likewise Doctors Lawrason Brown and Herbert M. King, now dead, have for years been coolly observing, investigating, and reporting soundly the best of opinions about tuberculosis.

These men and others like them in their specialty impress me very differently than does the usual physician of prominence with large consultation practice in the cities. I think that they tackle their problems and formulate their conclusions more in the ways that a medical director tries to make his selection of risks. They seem to me, in the many talks that I have had with them, to have a saner, fairer view of life insurance, and of the difficulties as well as of the necessities in the way of proper selection, than do those of the other type. So many of the latter boldly, and boastfully, tell their patients that the companies are to-day passing innumerable bad risks, and rejecting many that are absolutely first class, and are on the whole doing very inferior work because they do not take a Wassermann, an X-ray, and a cardiographic tracing of every applicant! And so many of these men are trying in vain to persuade us to accept as standard risks those whom we know from our experiences should be declined. And they impress us as very unpracticable and as so anxious to please and perhaps to favor the interests of the patient as to claim more for him than the facts warrant.

But those expert in tuberculosis matters acknowledge their own difficulties, as well as ours, and the difficulties of our

312 Twenty-Ninth Annual Meeting

medical examiners, in making correct diagnoses and prognoses of tuberculosis when they see the man only once, have only a short time for the examination, and the applicant telling no more than he has to in reply to the different questions that are asked him.

They appreciate, for instance, that occasionally, as has happened in the past year, patients with a supposed tuberculous condition are referred by the head of a sanatorium to another place where they are equally expert in the treatment of tuberculosis, and then after a number of weeks or months those patients are discharged and sent away because it has been determined that after all they are not tuberculous. Their Sanatorium records show that not over 50% of the patients admitted have had the limitations and the nature of the disease correctly described by the physicians previously attending them, even though their trouble was known to be tuberculous.

They appreciate and acknowledge, too, that sometimes a doubtful case admitted to a Sanatorium has to be observed and reexamined frequently over a long period before it can finally be decided whether he has or has not tuberculosis. Thus we see how our problem of properly selecting risks after one examination becomes in some cases a very big one.

It is difficult to criticize adversely what Dr. Rogers has said about the questionability of accepting those who have had active tuberculosis, they having certainly exhibited a tendency to break down with the disease. I am impressed, though, by his hints about those who have had no recurrence even after a lapse of ten years, and who are overweights. It seems to me that if we accept the prevailing theory that nearly all individuals are infected with tubercle bacilli during childhood and that having lain dormant until adult life, those bacilli then in some individuals reassert themselves by becoming active; that the disease may then become completely arrested under proper treatment, and the individual remain thereafter as an incipient inactive case,—it seems to me that it is not quite fair to say that such a case is not insurable, and I believe that some of them with that history, after a sufficient length of time, and

with the other features most favorable, are even entitled to standard policies.

Take for example the case of Dr. Irving Fisher who went to Colorado many years ago with his incipient tuberculosis, took the best of care of himself there until the disease became arrested, and who has remained perfectly well ever since; in fact he has shown very prominently and helpfully by his own example how that disease can be controlled, and how strong and rugged a man can be if he only lives rightly. Such a man is certainly entitled to life insurance.

Then too there is, of course, the type of tuberculosis that is really quite advanced and chronic, but the individual does not know that he is afflicted with it until he appears for an examination of life insurance. Probably he has gone along with the disease for many years without symptoms and without rise of temperature; perhaps he has even been sent to a Sanatorium for treatment, feeling as well when he entered it as when he comes out. There is simply the indefinite history of some indefinite illness twenty or thirty years ago, and practically no feelings of sickness since then. Those men live to pretty good old age and are entitled to substandard insurance when the risk can be correctly measured and the correct rating given.

Dr. Bartlett speaks very sensibly about the eligibility of those engaged in Sanatorium work without ever having been afflicted with active tuberculosis. I feel very strongly that many Medical Directors have been unfair in their discriminations against those lives. Naturally enough they have been prejudiced against them, and yet the facts are that living as they do in first-class up-to-date Sanatoria, they have decidedly more healthful existence and are far less likely to contract tuberculosis at the Sanatoria than is the case with those living outside of them; in other words, I believe that doctors, nurses, stewards, engineers, and all those employees in up-to-date Sanatoria for the treatment of the tuberculous, should be considered as eligible for standard policies of insurance if they themselves have not had the disease, and if they are in other respects acceptable.

314 Twenty-Ninth Annual Meeting

Take for instance the situation at Saranac as illustrating what I mean by the improbability of the well people at the Sanatoria coming down with the disease. You have there at Saranac a native population of 1500 and there are about 2000 patients quartered in the town. These are practically all tuberculous, many of them are far advanced, and in spite of the rigid regulations of the Health Board they spit in the streets and in public places. The native population, men, women, and children, mingle more or less with the patients, they go to the same places of entertainment and are certainly exposed to tuberculosis as much or more than are the average citizens in the Cities. Yet they have one advantage, and that is in living in the open air, sleeping with their windows open, and learning to follow those same habits of hygiene that benefit the tuberculous greatly. The result is that living as they do at Saranac, and even with the constant exposure to tuberculosis, yet only one native there has died within the past three years from tuberculosis contracted in the town. Thus I think that we have been unfair in discriminating against these people who live in Sanatoria and who make it their serious business to keep well. Their lives go along pretty easy roads, they do not have worries, they are generally well nourished, and I do not see why they are not perfectly good risks.

Dr. Bartlett appears to consider all cases of cervical adenitis as tuberculous, and yet recent studies have shown that many of these are secondary infections from diseased tonsils, adenoids, etc. I think that if he were to take only those cases of cervical adenitis wherein tuberculosis is demonstrable he would find many of them to have a co-existing pulmonary tuberculosis.

As to the applicants for insurance who have at sometime been patients at Sanatoria without ever really having had active tuberculosis, the burden of proof is, of course, upon them. There are such cases, and the complete and truthful history can generally be obtained from every first-class Sanatorium where good records are kept. If he did not have the disease, and if he is perfectly sound now, the individual is,

of course, entitled to standard insurance and should not be discriminated against.

As to empyemas, complicating influenza and pneumonia, I have seen a good many convalescents among the soldiers during the past summer and have been surprised by the rapid and quite complete recoveries which many of them have made.

Dr. Snow—F. B. Trudeau, in an article published three months ago, calls attention to the apparent unreliability of routine history in pulmonary cases. He bases this belief first on the examination of a group of 500 drafted men and an equal group of volunteers who were asked categorically four questions.

1. Family history of tuberculosis.
2. Pleurisy.
3. Cough lasting one month or more.
4. Hemoptysis.

In the case of the drafted men, 449 positive answers were given and from the volunteers, 135 positive answers were obtained.

	Drafted	Regulars
Family history.....	94	30
Pleurisy.....	80	22
Cough.....	161	61
Hemoptysis.....	161	61

Again in 12,000 examinations at Plattsburg, positive signs of tuberculosis, where there was also a positive history, were found in less than $\frac{1}{10}$ of one per cent. These men, however, had undergone preliminary examinations.

I have looked over our company's death claims for the past nine years to find 726 persons in whom tuberculosis was given as the cause of death. This is 8.7% of the total deaths and is to be compared with a tuberculosis incidence, in the registration area, of a little over 11%, all ages. From the age of average entrant, I should consider that selection had played a part in eliminating some of the hazard.

316 Twenty-Ninth Annual Meeting

Reference to the rather sketchy correspondence available in old files in the late '50's and early '60's, indicates that practically our first selective effect was made with this particular hazard in mind and it really seems as if experience had not taught us all we should know. In the cases which appear among our death claims, there is a surprisingly small number which show any defect in history, personal or family—even lightweight is not predominant. This apparently tallies with Trudeau's experience in the Plattsburg group.

In our own selection there have been noticeable shifts in opinion within the last 30 years but, in general, our attitude has been very severe in all cases where there was a breath of suspicion. Our results, however, do not seem to have been remarkably good and it is to be noted that nearly half of our claims on waiver of premium for total disability on insurance granted within 5 years are on the ground of tuberculosis. A brief summary of our action will be given though it varies little in detail from that submitted by Dr. Bartlett. At the present time we are allowing somewhat more latitude and do not convict of insurability on a word. I should like to add to the Essayist's plea for those who have been sent to a sanatorium on a mistaken or even a tentative diagnosis. It becomes more and more easy to establish the clarity of diagnosis in such cases but the actual visit is not proof of infection.

We have never accepted cases with a history of tubercular peritonitis. While apparent cure after laparotomy is recognized, the after history possesses decidedly doubtful features. We have accepted a few cases with a history of tuberculous orchitis or epididymitis 5 years or more after operation and I do not find a recorded death in this group though our experience is limited.

Cervical adenitis, the practical manifestation of glandular tuberculosis, is not considered by us as a cause of rejection after age 30, provided there has been no evidence of activity for 10 years or more.

With reference to bone manifestations, our attitude is not so liberal except when this has occurred in childhood without

recurrence. We are mindful of Keen's statement "Tuberculous disease of the bone in adults offers a much worse prognosis than in children." We have been fearful of the joint manifestations and we never knowingly accept a case where this occurred.

I do not think it necessary to strengthen the Essayist's position with reference to the significance of pleuritis but I might quote Landis—1917:

"It must never be lost sight of that primary pleurisy is relatively infrequent and in the absence of a demonstrable lesion which might cause it, a tuberculous origin is to be thought of whether exposure to cold has occurred or not."

"Hemoptysis or an attack of pleurisy are two of the ways in which pulmonary tuberculosis may suddenly manifest itself in an individual who is apparently healthy."

"The records of the Phipps Institute show that of 5,895 patients in whom a diagnosis of tuberculosis was made, 23.8% gave an antecedent history of pleurisy."

And then Lord states, "When pleuritis is referred to as primary, it should be understood that the starting-point in other organs has not been detected."

So-called idiopathic pleurisy, therefore, may be considered tuberculosis and its ultimate results little better, if any, than quiescent cases of the classic type. The error of the inexperienced examiner must be considered since a pleurodynia lasting for a few hours will be recalled by the applicant and often recorded as pleurisy. The careful examiner will eliminate doubt in these cases but many will bear investigation.

Hemoptysis has always been a cause for rejection by our company. In 12 years I find 3 such cases have been accepted because of the time factor and the apparent weight of evidence against tuberculous origin. I am now inclined to think two of them were tuberculous but they have not as yet become claims.

With reference to *fistula in ano* we follow practically the rules outlined by Dr. Bartlett.

The conclusion is that despite the evidence gathered through years of experience and the apparently drastic selection made, our own results are far from satisfactory.

318 Twenty-Ninth Annual Meeting

Dr. Wells—I have only a word to say, Mr. Chairman, on this very interesting paper. I was thinking, as I heard this discussion this afternoon, of the evolution that has taken place in the view of the Medical and the Insurance world with regard to the whole subject of tuberculosis. I can remember the time when a Life Insurance selector was very much afraid of any form of tuberculosis, and a hint even that it had ever been suspected meant a negative answer to an application for insurance. And I cannot get away from that feeling to-day, that when you are dealing with the subject of tuberculosis, you are on dangerous ground. Now, I do not mean by "dangerous ground," that it is a region that should not be explored and studied because oftentimes, exploration and investigation will reveal facts that otherwise might remain hidden and obscure. I remember last year being in Yellowstone Park, and I saw there a parcel of ground they called "Hell's Acre." I walked over a portion of it, to get used to the sensation, I suppose! But they told me that a few years ago, even that would have been considered absolutely unsafe, but investigation had revealed it, as a safe procedure.

Now, if it be true, as stated in Dr. Bartlett's paper, that 87% of all children under 15 are infected with tuberculosis, that is, showing it by test, and if only 24% of all people develop the disease we have 63% of the population that have come on from childhood, who have had a latent infection and yet are apparently healthy, not exhibiting any clinical symptoms. It seems to me, if that be true, and the statistics of the government and of insurance bear it out, then we are on somewhat dangerous ground. We find that 10% of all deaths in this country are due to various forms of tuberculosis, 141.6 per 100,000 or every tenth funeral due to this cause. Furthermore, you will find that this disease affects very directly those of insurable age, from 20 to 50 years so that you are on dangerous ground from Life Insurance viewpoint.

Regarding pulmonary tuberculosis, it seems to me that Dr. Rogers stated it very correctly when he said that it is "all dangerous," and the pulmonary form especially. There is

only one question with reference to a pulmonary lesion, from a Life Insurance standpoint, or any other for that matter—is it cured or not? Is it arrested or not? How can you tell? There is only one way, and that is, to employ the element of time. In all tubercular processes, there is going on caseation, which is destructive and dangerous, or sclerosis, which is conservative and healing. The ultimate question is, are the tissues of the body sufficiently strong and able to limit the growth of the invader, the bacilli, if it gets in? Dr. Osler has very well said, "there are tissue soils in which the bacilli are in all probability killed at once, that is, the seed has fallen by the wayside; there are others in which a lodgment is gained, and more or less damage done, but finally the day is with a conservative, protecting force, the seed has fallen upon stony ground; then there are tissue soil in which the bacilli grow luxuriantly, caseation and softening taking place, and the day is with the invaders, the seed has fallen upon good ground."

Now, when an applicant has presented himself, with a history of tubercular infection the question is present. Where has the seed fallen? Are the gates for protection in this citadel strong enough to resist the invader, to keep repelling him, or to limit to a certain location?

With regard to the different forms in which the disease is manifested, Dr. Rogers has covered that very fully. What interested me was not so much the uninsurable forms, those that you would reject outright, but those that Dr. Bartlett refers to as possibly insurable. Are they insurable? I do not know just what the doctor means by "possibly insurable," because the very first form that he refers to, "tubercular peritonitis," has mystified me. What is tubercular peritonitis? Where does it come from? It can only come from an infection. Where is the infection? Is there a tubercular foci in the bowel or in the kidney? If so, is that person safely insurable until that foci is removed? Then he says, if it is removed, he would not take the risk, and if it is not removed, he would not take it. I doubt if anyone here would take a case of tubercular peritonitis following operation, certainly not until

a long enough time had elapsed to prove that it was of no account.

I am not quite as hopeful as Dr. Rogers, in regard to pleurisy. He has had a greater experience along that line than I have, but, from an insurance standpoint, I have a great respect for this disease. I am afraid of it clinically, as a physician, and my observation in the Life Insurance field has led me to regard it with a great deal of suspicion. Take idiopathic pleurisy, coming on apparently without any definite cause, perhaps after "catching cold." You will often find in these cases a tubercular infection following pneumonia, gout, and so on. How can you tell there is not a distinct infection, and what are we going to do about it? It seems to me that Dr. Rogers has summed it up very well, that there are just too things to do, first wait long enough to prove that the invader has been expelled, or secondly has been rendered harmless, and that means from two to eight or even ten years; and I do not believe that any one of you gentlemen as a physician, clinically, would say to your patient within that time: "You are cured, and you need have no fear," certainly if he had had a lung lesion, a pleurisy, or an infection of the kidney. You would look on a tubercular kidney with suspicion, or a tuberculous testicle, until the element of time had demonstrated that there was no more danger—then you could give your opinion and your prognosis.

And second, I think it demonstrates from a Life Insurance standpoint, this fact, that medical examinations for Life Insurance should be conducted with a great deal more care than ordinarily is the case. I doubt very much that the time consumed by the average examiner in the field, examining an applicant for insurance, is sufficient to insure a thorough-going searching examination and investigation both as to a history of tuberculosis that may have occurred in the past, in the glands, larynx, lungs, bones, and the kidneys, as well as the present condition. I think it demonstrates the fact that we should have a more searching investigation on the part of the examiner, to discover a possible latent tuberculosis. Because

the person may not die of tuberculosis, they die, and who can say that underneath that pneumonia, rheumatism, or even typhoid, there was not a tubercular infection which so weakened the system that the patient fell an easy victim.

Dr. Wehner—Mr. Chairman: In regard to tubercular conditions, especially pulmonary tuberculosis where clinical symptoms have been manifested—markedly manifested and demonstrated—with the actual presence of tubercle bacilli, I do not think we, at any time, have a right to consider that case as an insurable one on Ordinary or Endowment plans. Personally, I feel that a rating on any plan sufficient to cover such impairment, even after a period of five, ten, or twelve years has elapsed would not be acceptable to an applicant.

In cases of tuberculosis of the bones and joints, we have been following, and I think, wisely, results of the Medico-Actuarial mortality investigation. I believe this investigation report shows in classes where such history is recorded less than ten years prior to the date of application, a mortality something like 190 per cent of the expected; but where such impairment occurred in the remote past, or over ten years prior to application, the mortality falls to 120 per cent of the expected. These cases, after the ten year period has passed, might be rated satisfactorily, particularly if they are not in a distinctly underweight class and the resulting deformity has not been marked.

Cases with histories of tubercular abdominal conditions and those of tubercular peritonitis, I would not touch.

I have in mind a case of an acute attack of tubercular peritonitis which occurred in my practice some twelve years ago. Dr. Hutchinson operated on this case. The patient was a young girl, a medium underweight, trained nurse who had charge of a tubercular patient. She had not only acted as stenographer and nurse, but did other work, swept up the rooms, etc. She was taken with abdominal pain and the symptoms were diagnosed as appendicitis and operation advised. After opening the abdomen and removing the diseased

322 Twenty-Ninth Annual Meeting

appendix, Hutchinson said: "Wehner, look here," and he showed me a tubercular condition of the peritoneum as marked as I have ever seen. I do not believe there was over $\frac{1}{2}$ square inch of normal peritoneal tissue without imbedded tubercles. He left in one drain and sutured the line of incision; in four days the drain was carefully removed. That girl made an uneventful recovery and after the lapse of twelve years she is and has been in good health. She is still of slender build but has had no further tubercular involvement and is able to conduct a tea house at Browns Mills, N. J. This is the only case of that kind of which I could really speak personally.

Dr. Wells referred to the large percentage of cases that developed tuberculosis before they are fifteen years of age—he mentioned 87 per cent. I believe that to be practically a fact, and think that tubercular disease may lie dormant for many years, and its later development or non development, depend upon the physical resistance of the individual. I believe if those children were to be put in an environment conducive to health, fed well, kept well, and developed plus weights for their ages, they will not develop the tubercular condition, at least a majority of them will be among the 65 per cent of healthy individuals as we see them—as desirable insurance risks, those that do not show any clinical tubercular symptoms.

As regards fistula, Dr. Rogers, I think, has covered that ground completely. In lightweights this impairment is a very important thing and I think cases with such a history should be acted upon guardedly. Among the heavyweights, however, a history of fistula is not so important. I think the known mortality among this class covers both the plus weight and the fistula history.

With reference to pleurisy, I am afraid that we often call cases pleurisy that are really cases of intercostal neuralgia. In general practice patients come to you in which you find no temperature or other suspicious symptoms or history except possibly a pain in the side. Clinically they come to you for some complaint of the heart, or possibly neuritis or perhaps some local pain in the intercostal muscles, etc. If the condi-

tion lasts less than a week or ten days and the patient has not been confined to house or bed, I ignore such history, particularly if the patient is normal in weight and the family history and personal factors in other respects are good. Where we suspect true pleurisy or there has been a history of effusion, the case is different. If the effusion is serous and apparently arises spontaneously, we would be very suspicious of tubercular cause and each case would be studied with the greatest care upon its own merits, declining or postponing action for at least two or three years.

In cases of empyema, however, particularly if associated with pneumonia and a good laudable pus had been present—where drainage had been efficient and followed by prompt healing—such cases we would treat as acceptable risks six months after recovery, without any rating whatever.

The Secretary read the following discussion by Dr. Arthur B. Wright:

It is not an usual procedure to insure applicants who have a past history of tuberculosis of the lungs, providing there are no active signs at the time of issuance; the safety of the company being assured by placing such risks in a substandard class, and issuing a policy with extra premium. It is also perhaps possible to accept as standard risks certain select cases where no actual diagnosis has been made, where none of the cardinal symptoms have been present, such as rise in temperature, night sweats, or the isolation of a tubercle bacillus, particularly if a sufficient length of time (perhaps ten (10) years or more) has elapsed. The figures as derived from the experience of Dr. Lawrason Brown of Saranac Lake are most valuable, and it is decidedly a question whether or not the most favorable arrested case attains a par with the normal individual. Dr. Brown doubts that any individual who has once had frank tuberculosis can ever be considered a normal risk. This, from a clinical standpoint, is evidently true inasmuch as such an individual undoubtedly has more or less of a

324 Twenty-Ninth Annual Meeting

damaged lung with restricted lung power, although the healthy lung tissues which remain may be able to take care of the individual in a normal manner. From a Life Insurance standpoint, however, the question arises whether or not it would be safe procedure to accept certain of these select cases as standard risks. This is borne out to a considerable extent by the Medico-Actuarial figures to indicate a more favorable mortality after several years have passed since the case became arrested.

In regard to non-pulmonary tuberculosis, the largest class with which we have to deal is probably glandular trouble. This is usually an affair of childhood, and if the trouble is removed by an operation and there is no recurrence over a period of several years, it is probably a safe procedure to accept such risks standard.

The only safe procedure in handling applicants with a past history of tuberculosis of bone is by placing them in a sub-standard class. A few rare cases, where the history is remote and the infection took place many years ago, may possibly be accepted standard. Where the joint has been involved and considerable drainage ensued, there is always a danger of recurrence. Hip joint disease and Pott's are the principal ones with which we have to deal, and it is a question if we can ever accept these standard. Where a great deformity has resulted in the spine, and resulted in the condition known as "Hump Back," the wisest procedure is not to accept for any form of insurance.

Pleurisy. The writer is inclined to differ from Dr. Bartlett that the dry pleurisies should be considered as seriously as the wet cases. The M.-A. Investigation classified these cases as follows:

Class 22—Pleurisy—purulent.

Class 23—Pleurisy—other than purulent.

In Class 23 it appears that the wet and dry pleurisies are grouped together. From these figures it is impossible to state how many of this group are wet and how many dry. While

there is no doubt that a certain number of dry pleurisies are tubercular in origin, there appears to be no proof that all are. We have been led to believe that the great majority of wet cases are tubercular in origin, however, there are individual cases where some other factor has been the cause. Probably the safe procedure is to attempt to treat each case as an individual one, and to give the benefit of the doubt to the company by allowing a sufficient length of time to elapse before accepting for insurance.

Hemoptysis. By this term is meant that the blood comes from the lungs. So many other causes arise which may render the risk doubtful, that the company must necessarily receive the benefit of the doubt. When in all probability the spitting indicates a lesion in the lungs, it becomes a much more serious matter. As stated by Dr. Bartlett, the greatest care should be exercised in selecting the risks, to exclude those of light build, and with unfavorable family and personal history. The general opinion of the writer is to the effect that all such cases are undoubtedly substandard within a certain number of years—at least ten (10)—and even after that time should be selected with great care.

Fistula in Ano. The Medico-Actuarial Investigation indicates that we must give this condition serious consideration. We are not in a position to say that all fistulæ are tubercular. It is, however, extremely difficult to isolate or designate which are or are not, and the same rule would apply, namely, to give the company the benefit of the doubt. In order to do this, we must allow a sufficient length of time to elapse, probably at least two (2) years, and select with great care, giving careful attention to build and personal history.

Dr. Jaquith—I am sorry that Dr. Bartlett is not present to hear the discussion and close it. He is on duty as a Lieutenant in the Medical Corps, at the Army Hospital, New Haven, Conn.

As I mentioned this morning, two years ago Dr.

326 Twenty-Ninth Annual Meeting

Charles Mayo extended to this Association a cordial invitation to analyze the records of the Mayo Foundation, in certain classes of cases. Mr. Arthur Hunter, Chief Actuary of the New York Life, volunteered to conduct this inquiry, and it gives me great pleasure to call upon Mr. Hunter for his report on the mortality results of operations on gastric and duodenal ulcers.

Mr. Hunter then gave a synopsis of his report to the Mayo Clinic, the full report of which is now submitted.

DR. CHARLES M. MAYO,
Rochester, Minnesota.

DEAR DOCTOR:

In the course of an address before the Association of Life Insurance Medical Directors you offered to put the statistics of the Mayo Clinic at their disposal. As the result of this generous offer I was asked by the Association to visit the Clinic, investigate the method of keeping the statistics, and determine the lines on which the first study should be made. After a conference with Dr. Plummer and yourself, it was decided to investigate the mortality among persons who had been operated upon for gastric or duodenal ulcer.

The statistics of your Clinic are kept in better shape than those of any other hospital whose records I have seen. Your method of corresponding with the patients after the operation resulted in your being able to keep in touch with most of them.

The first part of the investigation was undertaken by you. This consisted in bringing your data up to date by correspondence in order to determine whether the former patients were living or not, and, if not, by then endeavoring to ascertain the date and cause of death. After you had traced as many as possible, the records on the remainder of the cases were sent to me. A number of the insurance companies then offered to try to trace the cases through their inspection departments. This work was carefully and thoroughly done, and as a result of the combined work of the Mayo Clinic

and the life insurance companies, there were only 108 out of the 2431 cases which could not be traced.

All cases operated upon from January, 1906, to December, 1915, were included. It was thought inadvisable to include any cases prior to 1906 because the technique of operations has changed materially in recent years, and because the system of keeping records was not so good as in later years.

As already stated, there were 2431 cases that had been operated upon, and of these, 108 could not be traced and were excluded from the investigation, leaving 2323 to be investigated. The effect of leaving out the 108 cases that could not be traced is the same as if we assumed that the mortality among these cases was identical with that among those included in the investigation. After considering the conditions under which the data were collected, there seems no reason to expect that there was a higher death rate among the persons who were not traced than among those who were traced, but the effect of assuming a higher death rate among the former than among the latter will be shown.

OPERATIVE DEATHS,
INCLUDING THOSE WITH ACUTE PERFORATIONS

In order to obtain a measure of the effect of the operations in prolonging life, the deaths on the operating table, or in the hospital soon thereafter, should be omitted, as this group was primarily operated upon for an acute condition, not for the cure of the gastric or duodenal ulcer. This would still leave among the other cases the persons who died later, but had unrecognized early carcinoma at the time of operation.

There were 545 persons operated upon for gastric ulcer, among whom were 24 operative deaths, or 4½%. There were 1684 cases operated upon for duodenal ulcer, among whom there were 33 operative deaths, or 2%. The operative death rate from gastric ulcer, including deaths in hospital soon after operation, was therefore fully twice that from duodenal ulcer. In the following report the operative deaths have been omitted.

328 Twenty-Ninth Annual Meeting

The cases included may be classified as follows, according to the year of operation:

NUMBER OF CASES OPERATED UPON, EXCLUDING OPERATIVE DEATHS

Year of Operation	Gastric Ulcer	Duodenal Ulcer	Gastric and Duodenal Ulcer	Total
1906	31	54	13	98
1907	22	45	3	70
1908	31	64	1	96
1909	34	94	4	132
1910	48	113	4	165
1911	50	138	6	194
1912	56	190	3	249
1913	65	244	16	325
1914	87	303	20	410
1915	97	406	21	524
Total	521	1651	91	2263

All cases were considered as coming under observation on the date of the operation and going out of observation on the anniversary of the day of the operation in 1916 or on the anniversary following death. There was a small number of cases last heard from at some date prior to the anniversary of the operation in 1916, and these few cases were considered as going out of observation at the anniversary of the operation nearest to the date when last heard from.

There were 124 cases where two or more operations had been performed, and these were included in the above, being considered as coming under observation at the date of the first operation. They may be classified as follows:

Number of Operations	Gastric	Duodenal	Gastric and Duodenal
2	43	68	3
3	1	7	-
4	-	1	-
5	-	1	-

The data included in the investigation may be summarized as follows:

Gastric Ulcer. The 521 cases were under observation on the average for 3.6 years, and in that time 88, or 17% of the total, died.

Duodenal Ulcer. The 1651 cases were under observation on the average for 3.4 years, and in that time 85, or about 5% of the total, died.

Gastric and Duodenal Ulcer. The 91 persons were under observation for an average period of 3.8 years, and in that time 9, or 10% of the total, died.

MORTALITY INVESTIGATION

The purpose of the mortality investigation of persons who have been operated upon for gastric or duodenal ulcer is to ascertain what has been the saving of life as a result of the operation. Theoretically this could only be done if the following information were available: (1) We would have to take a large group of persons who were suffering from gastric ulcer (or duodenal ulcer) and who had not been operated upon, and trace the mortality among these persons from the time when the operation would have been performed in their cases. (2) We would then have to take a large group of persons who had been operated upon for gastric ulcer and trace the mortality among them from the time when they were operated upon. The comparison of (1) and (2) would give the best indication of the saving of life that had resulted from the operation. This investigation is not practicable because the information under (1) is not now available. What we have now obtained is the information under (2), inasmuch as we have now the means of tracing for several years after operation the mortality among a group of persons who have been operated upon for the same disease.

The fact that 17% of those operated upon for gastric ulcer have died within an average period of observation of 3.6

years, and the fact that 5% of those operated upon for duodenal ulcer have died within an average period of observation of 3.4 years, are in themselves significant. While we cannot tell how many lives have been saved by reason of operation for duodenal ulcer, it may safely be stated that the survival for three and a half years after the operation of 95% is a high tribute to the skill of the surgeons. With such a serious condition as gastric ulcer, a death rate in three and a half years of 17% of those operated upon appears to be low. While I cannot prove my statement, I believe that a much larger proportion of the lives would have died but for the operation, and that many years of life in the aggregate were saved through your surgical treatment.

In the past, statistics regarding operations have dealt with the percentages of cases which survived the operation, and it is therefore a new idea to endeavor to determine the duration of life after operation compared with the general population. In accordance with our understanding, I wish to compare the lifetime of a group subject to an operation with a body of the population corresponding in numbers and in ages. By so doing, we could determine approximately the significance of the statistics collected by us. Their significance can best be measured by taking groups of 521 persons and 1651 persons at random from the general population of like distribution as to age and sex as the groups that were operated upon, and record the deaths in these groups during the period of observation. A comparison of the deaths in these general population groups with the groups that have been operated upon for gastric and duodenal ulcers, respectively, will tell us by how much or by how little the mortality in the groups operated upon has differed from the mortality in like groups in the general population. To do this we have selected the United States Life Tables, 1910, as the basis for the general population groups. These tables give the average death rate at each age among white men and among white women in the original registration states, and such death rates are derived from a comparison of the deaths in the years 1909,

Hunter—Report

331

1910, and 1911 with the population at July 1, 1910. The comparison works out as follows:

GASTRIC ULCER

DEATHS IN GROUP OF 521 PERSONS OPERATED UPON

(1) Year Following Operation	(2) Deaths
1st	36
2d	21
3d	11
4th	7
5th	7
6th and subsequent	6
	<hr/> 88

GENERAL POPULATION GROUP OF 521 PERSONS WITH LIKE DISTRIBUTION AS TO AGE AND SEX OBSERVED DURING SAME PERIOD OF TIME

(3) Year of Observation	(4) Deaths
1st	8.2
2d	6.5
3d	4.9
4th	4.1
5th	3.0
6th and subsequent	5.6
	<hr/> 32.3
(5) Number of Persons under Observation for One Year in Either Group	(6) Percentage of Column (2) to Column (4)
521	439%
387	323
285	224
220	171
165	233
301	107
	<hr/> 272%

The above table shows that in the first year following operation the deaths in the group operated upon were only four and one third times the deaths in a like group in the general population, and that this percentage diminished, in the second year being only three and one quarter times, and in the later years still less. If we combine the third and subsequent years, the number of deaths in the group operated upon is

332 Twenty-Ninth Annual Meeting

not as large as double the number in the corresponding general population group. The percentage of the total deaths in the group is not significant because, if the data had been available for observing the group for a much longer period of years, the figures indicate that the number of deaths in the group operated upon would in the later years have approached nearer the number of deaths in the general population group, and, consequently, the total percentage would have been less than it is. With an average period of observation of only three and a half years, the deaths in the year following operation when the mortality is highest have much greater weight on the total than if the observations were continued for a longer period.

As already mentioned, there were 108 persons who could not be traced, of whom 22 had been operated upon for gastric ulcer. Assuming that the distribution of deaths among these 22 was the same with regard to the number of years elapsed since the operation as among the 88, and assuming that there was double the mortality among the former as among the latter, the relative mortality would be 282%, instead of 272%; if half of them had died, the relative mortality would be 294%, instead of 272%.

The similar comparison of the mortality in the group of 1651 persons operated upon for duodenal ulcer with the mortality in a general population group of 1651 persons with a like distribution as to age and sex, and observed for the same period of time, is as follows:

DUODENAL ULCER

DEATHS IN GROUP OF 1651 PERSONS OPERATED UPON

(1) <i>Year following operation</i>	(2) <i>Deaths</i>
1st	22
2d	20
3d	9
4th	10
5th	11
6th and subsequent	13
	<hr/> 85

Hunter—Report

333

GENERAL POPULATION GROUP OF 1651 PERSONS WITH LIKE DISTRIBUTION
AS TO AGE AND SEX, OBSERVED DURING SAME PERIOD OF TIME

(3) Year of Observation	(4) Deaths
1st	24.0
2d	18.6
3d	14.3
4th	11.2
5th	8.3
6th and subsequent	16.7
	<hr/> 93.1
(5) Number of Persons under Observation in Either Group	(6) Percentage of Column (2) to Column (4)
1651	92%
1218	108
902	63
658	89
461	133
816	78
	<hr/> 91%

These figures bring out the remarkable fact that in the first two years following operation for duodenal ulcer the mortality is only that of the general population group, and that after the second year the mortality is less than that in the general population group, showing 43 deaths in the group operated upon compared with 50 in the general population group.

If it were assumed that the 84 persons who could not be traced had the same distribution of deaths by years elapsed since operation as the 1651 persons, then the mortality in the whole group would still be less than among the general population, even if the mortality among the 84 was double that among the 1651; but the relative mortality would be 130% if as many as half the 84 persons had died.

It would be rash to come to the conclusion that the mortality among the foregoing group was improved by the operation for duodenal ulcer, as the mortality on the type of persons from whom your clinic draws its clientele is better than that of the population, as there was not a large number of cases, and as all the cases had not been traced.

334 Twenty-Ninth Annual Meeting

It does not seem necessary to make any further analysis of the small group of 91 persons operated upon for both gastric and duodenal ulcers. This group was under observation for about the same period of time as the groups operated upon for gastric ulcer and duodenal ulcer, respectively. The deaths are proportionately greater than in the duodenal ulcer group, and less than in the gastric ulcer group.

CAUSES OF DEATH

The causes of death were not given in the majority of cases, and accordingly an analysis would not be of value. Moreover, as the information was frequently obtained from laymen, no discrimination was made between deaths from duodenal and gastric ulcer; nor could it be determined whether "stomach trouble," a cause occasionally given, would cover either of the foregoing, or cancer.

In reporting the results of the investigations it was not found advisable to differentiate between men and women, because there were not enough of the latter and because there was a large proportion of cases among women which could not be traced, owing to the married name only being given: thus, Mrs. John Smith, instead of Mrs. Mary Smith.

SUMMARY

The following is a summary of the results:

1. The percentage of operative deaths in the hospital following operation for gastric ulcer was fully twice that for duodenal ulcer, but the percentage in both cases was very low considering the seriousness of the condition—a high tribute to the skill of the operating surgeons.
2. The mortality among persons operated upon for gastric ulcer is three times as high as among those operated upon for duodenal ulcer during the three years following the operation.
3. The mortality among persons operated upon for gastric ulcer decreases relatively after operation, but the data are

not sufficiently extensive to determine the number of years which must elapse before the death rate is similar to that of the general population.

4. The mortality among those operated upon *in your Clinic* for duodenal ulcer is less than that among the general population.

It may be of interest to you to know that the average age at time of operation of those operated upon for gastric ulcer was 47 in the case of men, and 43 in the case of women; the average age of those operated upon for duodenal ulcer was 44 and 42 respectively.

The investigation, so far as I know, is the first of this kind made by any clinic, and I sincerely hope that arrangements can be made to continue the work in the present scientific spirit.

Yours very truly,
ARTHUR HUNTER.

Mr. Hunter—Some of you may wish to know whether in my judgment it would be safe to follow the statistics of the Mayo Clinic in the acceptance of risks. For example, could the extra premiums for gastric ulcer in the case of an applicant who had had an operation two years ago be based on the death rate shown in the report; could an applicant who had had an operation for duodenal ulcer six months ago be safely accepted at the regular rate of premium? My general reply is—

(1) That, as the surgeons at the Mayo Clinic are very skillful, it would hardly be safe to assume that the operations at all hospitals would be followed by equally favorable results.

(2) That there is a selection against the companies which is not shown by the statistics. It is not by any means sure, for example, that the applicants who apply for insurance after an operation for duodenal ulcer represent the average in that group. They may include persons who have premonitions of further trouble which the Medical Examiners could not find, and in such cases the largest amount of insurance which the men could afford would be taken.

336 Twenty-Ninth Annual Meeting

So far as concerns applicants who have had gastric ulcers, I recommend an extra premium to cover a substantial increase in the mortality mentioned in the above report—an extra mortality of at least 50% for safety.

So far as concerns the cases of duodenal ulcer, I question whether they should be accepted without extra premium until at least two years after the operation, and then only on a very careful examination.

It is to be hoped that the foregoing report, which will doubtless be sent to many hospitals and clinics, will result in other institutions investigating their experience on persons operated upon for duodenal and gastric ulcer. In the meantime, it is the expectation that we shall take up another subject with the Mayo Clinic. Dr. Plummer informs me that he is very desirous of proceeding with another investigation, but he is still handicapped with lack of the necessary help, due to the war and its aftermath.

Dr. Jaquith—We are deeply indebted to Mr. Hunter for the work which he has done on this subject, and I feel sure he would be glad to answer any questions any of you wish to ask him.

Dr. Knight—May I ask Mr. Hunter if he inquired at all into the frequency with which cancer accompanied or followed those gastric ulcers?

Mr. Hunter—No, there was only one question that came up in connection with that, a question which Dr. Plummer raised, when he said that he believed that a number of these cases that had been operated on had the seeds of cancer there when the operation took place, and were really operated on for gastric or duodenal ulcer when they should have been operated on for cancer.

Dr. Jaquith—Since shortly before the war began, articles have appeared in the British and other medical journals, dealing with circulatory changes found on examination of soldiers who have returned from

Disturbances of Circulatory System 337

the front. In announcing the title of Dr. Russell's paper: "Disturbances of the Circulatory System from the Army and Insurance Standpoints" it gives me pleasure to call upon Dr. W. E. Porter, who has consented to lead the discussion.

DISTURBANCES OF THE CIRCULATORY SYSTEM FROM THE ARMY AND INSURANCE STAND- POINT

BY EUGENE F. RUSSELL, M.D.

Medical Inspector, Mutual Life Insurance Company of N. Y.

Owing to the interest that Medical Directors have in the selection of risks showing circulatory impairments, it occurred to me that perhaps some important data might be obtained if an investigation was made of the procedures in the selection of applicants for service in the army. During the past four years an enormous amount of research work has been done in this line of work, and regulations for the selection of risks for the army have been formulated which vary somewhat from those used by insurance companies.

Up to a very recent date insurance companies doing a straight standard business looked with disfavor on cardiac murmurs of all kinds. But modern investigation has changed some of the preconceived ideas of clinicians, and principles have been formulated which from our standpoint are bound to have a practical bearing on the future selection of these risks. It is a fact that in many individuals showing various clinical murmurs and circulatory impairments no lesion was discovered at autopsy, and that a large number of persons showing so-called heart murmurs live their expectancy without the least symptom of heart disease.

It has been the effort of the War Department to give the proper classification to these individuals and to separate those showing organic lesions from those showing the so-called

functional conditions. Neither the British nor American War Departments are desirous of having men for first line service whose circulatory systems are not normal and who are expected to break down under strain. In the case of heart murmurs the War Department regulations insist that the interpretation must be based on cumulative evidence. They insist that in a heart of normal size and responding normally to effort, if a murmur is discovered it is accidental and insignificant unless it can be demonstrated that there is aortic or mitral disease. It is recognized by them that murmurs are very frequent in the absence of valvular lesions especially under the influence of excitement and exertion. The regulations of the War Department classify these functional murmurs as:

- (1) Those heard over the 2d and 3d left interspace during expiration and disappearing during forced inspiration;
- (2) Those heard at apex on excitement especially in recumbent position;
- (3) Systolic accentuation of the respiratory murmur especially on inspiration. These are heard near the apex or over the back.

Taking up the basic murmurs from an insurance standpoint it is the consensus that inconstant systolic murmurs heard at the 2d or 3d intercostal space to left of the sternum have no significance but it is important that any pathological condition of the apex of the left lung be ruled out.

Constant systolic murmurs heard at the 2d and 3d left intercostal spaces are frequently met with. The British and American War Departments consider these of no significance but emphasis is laid on the fact that there must be no hypertrophy of the heart, no irregularities, no dyspnoea, and a normal response to exercise. It has been the custom of many of the insurance companies to look with disfavor on this type of murmur but such authorities as Mackenzie and Allbutt of England, the late Dr. Janeway of this country, and many others whose experience extends over a number of years and who have seen many of these cases go to autopsy that they have no pathological significance, unless there are some

Disturbances of Circulatory System 339

associated symptoms or signs. As this type of murmur is at times supposed to be due to lesion of the pulmonary valve it may not be out of place to quote Pitt who states that pulmonary incompetence is the rarest of valvular lesions, that during thirty-two years' experience there were only 24 cases out of 16,000 on postmortem examination, that there are only 109 cases from the records of Guy Hospital besides 30 published clinical cases which were not verified by autopsy.

These murmurs are common in individuals with thin flexible chests who can produce extreme forced expiration. In some of these cases also a thrill is felt which has no significance.

Constant murmurs at the right of the sternum, especially those in the 2d right intercostal space, disbar as a rule from military service. The only exceptions are the:

(a) Pressure murmurs which are definitely localized;

(b) Those that are slight with the response to exercise normal and not transmitted, and without any associated signs. It has been our practice to reject all such murmurs, except those that are typical pressure murmurs, as they are considered to be due to some definite valve lesion.

The significance of the apical murmurs has caused considerable controversy during the past five years, but authorities are about agreed that all murmurs that are constant and are not systolic in time are cause for rejection for first line service in the army and for standard insurance. With the systolic murmurs we have on one side Allbutt, who claims that in all cases of a definite systolic murmur at the apex there is regurgitation, on the other Mackenzie in England, and Cabot in this country, who contend: (1) there is no significance to an apical systolic murmur unless there are some associated signs such as hypertrophy, dyspnoea, accentuation of 2d sounds at base; and (2) that there can be no valvular condition unless there is hypertrophy or associated signs.

This latter view has been rapidly gaining ground in England owing to the work of the Medical Research Committee on Soldiers' Hearts and their results have been taken into consideration by our own War Department. The result of their

work has been to establish the fact that systolic murmurs, irrespective of their character, are of no value if taken by themselves in estimating the capacity of a soldier's heart. "In forming an opinion of a heart, reliance must be placed on history of rheumatism, objective distress on test exercises, upon rapid heart action with slow decline of rate after exercise, and upon hyperalgesia of chest wall." Lewis states in this report that actual heart disease in young soldiers in the absence of a history of rheumatic fever or of syphilis is a comparative rarity. This report also shows that the response to the exercise test is the most important factor on which a judgment of heart capacity can be made. To determine whether a heart is normal—if there is a systolic murmur at the apex—any possible history of rheumatism, syphilis, diphtheria, streptococcus, or other infection should be eliminated. Associated signs such as dizziness, dyspnoea, precordial pain, hypertrophy, or accentuation of 2d aortic sound must be ruled out. Then the response to exercise must be judged. The exercise test consists of walking briskly up forty steps as suggested by Lewis, or hopping twenty times or more on each foot raising the shoulders nine inches at each hop (U. S. Government Requirement). In a healthy heart the pulse rate increases to 110–120 per minute during the exercise and will fall to normal within two minutes after the exercise ceases. Any heart with a systolic murmur that shows none of the associated signs and responds normally to the exercise test is considered to be normal. Up to date it has not been the custom of the companies to consider these cases on standard rates, but it is a probability that in the future more stress will be placed upon associated signs and response to exercise tests in judging whether these murmurs are functional or organic. Constant pressure murmurs at the apex are much influenced by respiration being intensified either during inspiration or expiration, and are more marked in the recumbent position. Potain states that if the change from the dorsal decubitus to the sitting position causes the complete or almost complete disappearance of the murmur it can be confidently ascribed

Disturbances of Circulatory System 341

to extra cardiac causes. It must be remembered also that pressure murmurs do not entirely take the place of the first sound at the apex and that they are not heard at the exact apex but usually above and to the right.

Rate and Rhythm. As a rule applicants showing persistent pulse rates of 100 or over when in a recumbent position or a pulse rate of 50 or under are rejected by the army and insurance companies.

Rapid pulse suggests exophthalmic goiter, tuberculosis, or other infection. It is common knowledge that a considerable number of cases of hyperthyroidism which have been overlooked by the draft examiners, have been discovered in the various cantonments.

Under 50 pulse rate is suggestive of heart block and the exercise test should always be employed in these cases.

Irregularity of the respiratory type is common in the young and is of no significance, neither is an occasionally intermittency where the response to exercise is normal. Frequently the irregularity and intermittency will disappear on exercise.

In order to demonstrate the theory that a large number of so-called cardiac conditions are functional and inconstant and that the conclusions drawn by the War Department could be substantiated in part by the results of the insurance companies, we have investigated the number of applicants which were believed to have some circulatory impairment and which were accepted by the Mutual Life on subsequent examination.

During 1917 there were 1099 of these cases, or 1.32% of the total number of applications, of which 297, or 27% were reported to have had heart murmurs; 284 or 25.8% rapid, irregular, or intermittent pulse; 139 or 12.6% high blood-pressure; 57 or 5.2% hypertrophy of heart; 39 or 3.5% arteriosclerosis; 56 or 5% heart murmur with rapid, irregular, or intermittent pulse; 49 or 4.5% with heart murmur associated with hypertrophy of heart.

For six months from May to October inclusive in 1918 there were 404 cases or 1.11% of total number of applications, of which 105 or 26% had heart murmurs, 91 or 22.6% had rapid, irregular, or intermittent pulse; 75 or 18.6% had high blood-

342 Twenty-Ninth Annual Meeting

pressure; 8 or 2% had hypertrophy of heart; 4 or 1% had arteriosclerosis; 19 or 4.7% had heart murmurs with rapid, irregular, or intermittent pulse, and 16 or 4% had heart murmurs associated with hypertrophy of heart.

The following table illustrates the number and percentage of these cases in detail:

	1917		SIX MONTHS MAY TO OCTOBER, 1918	
	Cleared	Percent of Total Cleared	Cleared	Percent of Total Cleared
Any circulatory disease not men- tioned below.....	8	.7	2	.5
Functional Cardiac trouble.....	284	25.8	91	22.6
Heart Disease.....	11	1.0	14	3.5
Hypertrophy of Heart.....	57	5.2	8	2.
Heart Murmurs.....	297	27.0	105	26.0
Arterial Sclerosis or Atheroma...	39	3.5	4	1.
High Arterial Tension.....	139	12.6	75	18.6
Low Arterial Tension.....	20	1.8	9	2.2
Functional Cardiac Trouble } ..	6	.5	3	.7
Heart Disease				
Functional Cardiac Trouble } ..	56	5.1	19	4.7
Heart Murmurs				
Heart Murmurs } ..	16	1.5	8	1.9
High Arterial Tension				
Functional Cardiac Trouble } ..	16	1.5	14	3.5
High Arterial Tension				
Hypertrophy of Heart } ..	49	4.5	16	4.
Heart Murmurs				
Functional Cardiac Trouble } ..	11	1.0	3	.7
Hypertrophy of Heart				
Functional Cardiac Trouble } ..	9	.8	7	1.7
Hypertrophy of Heart				
Heart Murmurs } ..	8	.7	....	....
Heart Murmurs				
High Arterial Tension } ..	8	.7	....	....
Functional Cardiac Trouble				
Arterial Sclerosis or } ..	6	.5	5	1.2
Atheroma				
Arterial Sclerosis or } ..	6	.5	5	1.2
Atheroma				
High Arterial Tension } ..	5	.5	4	1.
Functional Cardiac Trouble				
Heart Murmurs } ..	5	.5	4	1.
High Arterial Tension				

All other impairments and other combinations each reached less than $\frac{1}{2}$ of 1%.

None of the above cases were accepted unless there were two examinations made or the examiner was aware of the suspected impairments at the time of the examination, and no cases of heart murmurs were accepted if the murmur was heard through the phases of respiration either in the erect or recumbent position. Exercise was required to bring out any possible murmur.

With the possible exception of mitral stenosis, organic heart murmurs are constant from day to day and as mitral stenosis is not met with very frequently in insurance examinations it need not be considered in the above table.

BIBLIOGRAPHY

Office of Surgeon General, War Department, *Circular No. 21*.

L. F. MACKENZIE. *Some Circulatory Impairments Found in Life Insurance Examination*.

SIR JAMES MACKENZIE. *The Recruit's Heart*.

ALLBUTT AND ROLLESTON. *System of Medicine*.

Medical Research Committee, 1917. "Reports upon Soldiers Returned as Cases of Disordered Action of Heart or Valvular Disease of the Heart."

DISCUSSION

Dr. Russell—Since my paper was written, a considerable amount of investigation has been made on the significance of cardiac murmurs and numerous articles are beginning to appear in the medical magazines, giving the experience of the cardiac experts of the United States and British Armies.

As to the prevalence of cardiac conditions among drafted men, Fahr reports that out of 55,000 men examined, .09% showed true aortic insufficiency; .07% showed mitral insufficiency and 3.2% showed accidental murmurs. Of these, 2.5% were systolic and loudest over the apex and .6% were over the second left intercostal space. Out of the 55,000 men examined, there were only 10 cases of mitral stenosis. The percentage of accidental murmurs found by him in his work in the Texas Camp, corresponds to a great extent to that found by the Examiners in the various other Camps.

344 Twenty-Ninth Annual Meeting

The result of several investigations now being made as to the ultimate results of the men showing accidental murmur, will lead to very definite data.

Fahr likewise reports in the *Journal of the American Medical Association*, issue of January 18, 1919, that 10% of the men discharged from the British Army were on account of heart disease and that $2\frac{1}{2}$ times as many men are pensioned for heart disease as for loss of limbs and twice as many as for nervous disease, shell shock, and epilepsy.

To be able to discover whether a murmur is functional or organic, requires the use of a number of tests and if these tests were put into use by the Examiners, I believe that the number of cases declined on account of so-called murmurs, would be greatly lessened. Likewise, I believe that the fair mortality which the companies doing substandard business are believed to obtain from their heart cases, is due primarily to the fact that a number of these cases are accepted on substandard rates when they are entitled to regular standard rates.

The table which I have embodied in my paper illustrates the fact that a number of these heart conditions are in reality transitory.

It will be interesting to keep track of this type of case for I believe that much important data may be obtained and I feel confident that we will be able to liberalize somewhat our ideas in regard to cardiac conditions.

Dr. Porter—Dr. Russell has outlined the present position of the profession in regard to cardiac findings in their bearing upon Life Insurance and army rulings, in a most concise and satisfactory manner.

It has been my privilege to conduct a careful investigation of the subject and examine personally most of the cases coming to our attention, and I have conferred with men connected with the leading medical schools and hospitals of the country, with a view of determining the most correct course to be followed from the Life Insurance standpoint.

The position of the late Theodore C. Janeway and his associates is clearly set forth in Circular No. 21 of the War

Department, referred to by Dr. Russell. In that, special attention is called to the fact that murmurs may be present in the absence of valvular lesions, and may occur in perfectly healthy hearts, especially under the influence of excitement and exertion.

The first class of cases referred to by Dr. Russell from this report, viz.: those heard over the second and third left interspaces, during expiration, disappearing during forced inspiration, is of the greatest interest and importance. The murmurs are frequently found in subjects with flexible chests, who can produce extreme forced expiration. It is claimed by some that dilatation is an etiological factor, but in the majority of cases they are CAUSED BY AN INCREASED INTRATHORACIC PRESSURE UPON THE HEART AND BASIC VESSELS and have the general characteristics of true valvular murmurs, though somewhat smoother in quality and shorter in duration. Usually they are inconstant, but occasional murmurs in this location are heard constantly throughout the entire respiratory cycle, which may be included in this group. Pending further study of these cases, however, it will be wise to accept, as a general practice, only those which are not heard constantly throughout the respiratory cycle, either in the standing or recumbent position. With applicants under 40 years of age, where the frequency, rhythm, and character of heart sounds are perfectly normal, with no hypertrophy and no history of any infection which might be a cause for valvular disease, they may be accepted where the murmur is heard constantly in this location; but such selection should only be safely made by experts in physical diagnosis. In all of these cases the possibility of pathological change in the lungs should be excluded.

The second class, heard at the apex on excitement, especially when recumbent, are notably inconstant and can usually be eliminated as a factor, excluding acceptance for life insurance, owing to their inconstancy. Our position with reference to them should be that they ought not to be a cause for rejection WHERE THEY ARE NOT HEARD CONSTANTLY, PROVIDED THE HEART SOUNDS THEMSELVES ARE CLEARLY AUDIBLE. The

346 Twenty-Ninth Annual Meeting

reason for this proviso is that in fat subjects, with thick chest walls, at full inspiration both the murmur and the heart sounds may be practically inaudible, in which case it would not be safe to assume that the murmur was inconstant and not due to valvular defect.

The third class is referred to as systolic accentuation of the respiratory murmur, especially on inspiration, heard near the apex or over the back. These also should be considered as pressure murmurs and are called by some "cardio-pulmonary." They are usually heard with maximum intensity to the right of the apex and over much of the area occupied by the right ventricle and not at the exact apex and, furthermore, they are not conveyed toward the axillary line to the same extent as are murmurs produced by leakage of the mitral valve. They are usually most marked in the recumbent position and often disappear when the erect or sitting posture is assumed. Unfortunately, however, it is a fact that murmurs due to organic mitral disease are sometimes similarly influenced. Potain says that if the change from the dorsal decubitus to the sitting position causes the complete or almost complete disappearance of the murmur, it can be definitely ascribed to extra-cardiac causes. His explanation of the cause of these murmurs is an aspiration of some of the alveoli of the lung, produced by the cardiac impulse.

MacKenzie and Lewis regard these murmurs as functional or inorganic, whereas Allbutt holds that all apical systolic murmurs indicate mitral regurgitation. In view of the diversity of opinion still existing, it is of the utmost importance that selection of these cases be made with the greatest care, those only being accepted who have been examined by examiners whose ability is known to the medical director.

Whereas postural influence cannot serve as a definite determining factor as to the character of these sounds, I wish to emphasize the fact that the relation of the murmur to the movements of respiration does serve as such. The cardio-pulmonary pressure murmur heard in this location is usually much influenced by respiratory movements, being intensified

during inspiration and usually disappearing at the end of forced expiration. Occasionally, however, the increased intrathoracic pressure upon forced expiration will increase the intensity of the sound. If at any phase of respiration the murmur entirely disappears, the heart sounds still being clearly heard, it may be assumed that the condition is not due to organic valvular defect.

Whereas in the past special stress has been laid upon the influence of respiratory emphasis, posture, and position of the murmurs in determining their character and significance, the following factors should to-day be considered of equal or even greater value: (1) History, when obtainable, of infection of any sort, especially that the result of rheumatism, pyorrhœa, tonsillitis, otorrhœa, nasopharyngeal sepsis, diphtheria, or scarlet fever; (2) personal history of palpitation, breathlessness, pain, giddiness, fainting, exhaustion, and headaches; (3) the presence of apparent cardiac enlargement; (4) abnormal reaction to exertion; (5) abnormal intensity of the second sound over the second left interspace or third left costochondral junction; (6) lack of normal heart muscle tone; (7) abnormal blood pressure; (8) tachycardia or cardiac arrhythmia.

It should be borne in mind, however, that with the examinations for life insurance, the personal history is not dependable, owing to frequent withholding or misrepresentation of important facts.

The apparent size of the heart upon examination moreover is often misleading. The normal adult male heart in the oblique position measures about five inches, but marked variations in position are found, and a normal-sized heart transversely placed may appear larger than an hypertrophied organ in an unusual vertical position. Were it feasible to have a Roentgenogram of each questionable heart examined, this element of error could be eliminated. Until this is possible, we should bear in mind the fact that the results of palpation and percussion, even with experienced examiners, vary greatly, so that too much stress should not be laid upon a report of apparent enlargement.

348 Twenty-Ninth Annual Meeting

Only an expert is capable of accurately determining the character of heart muscle sound, so that this feature is of questionable value as a general procedure.

Again, the significance of apparent accentuation is only of value where experts are employed.

Satisfactory observation of reaction to exertion meets with a practical difficulty in life insurance work, owing to the fact that the applicant frequently objects to submitting to the annoyance of the requirements. To obtain most accurate results, the applicant should be requested to hop from forty to one hundred times on the left foot, the left shoulder being elevated from four to six inches. Two minutes after the end of the exercise the ventricular rate should return to within approximately ten beats of normal and the blood-pressure to normal.

Systolic and diastolic blood-pressure readings should be carefully studied as a valuable aid in all questionable cardiac cases.

Tachycardia and cardiac arrhythmia, especially with applicants past forty years of age, when associated with questionable cardiac murmurs, should necessitate rejection.

With reference to personal history of symptoms having a bearing upon the subject, the following may be enumerated: palpitation, breathlessness, pain, giddiness, fainting, exhaustion, and headaches. Any of these may be significant, and applicants having inconstant cardiac murmurs should be thoroughly questioned as to the possibility of any of these symptoms indicating organic disease of the heart.

Basic systolic murmurs with maximum intensity to the right of the sternum, heard at all phases of respiration, should invariably be rejected. They indicate the existence of definite abnormality of the aortic valve and are not acceptable.

THE PRESENCE OF ALL MURMURS OTHER THAN SYSTOLIC SHOULD NECESSITATE REJECTION.

In order to establish a uniform basis of action by all companies represented in this Association, for the coming year I would suggest that the acceptable classes outlined by Dr.

Russell in his paper and covered in this discussion be considered in two groups, viz., "A" and "B," and am passing slips about for further suggestions from those present, in order, if possible, to enable us to adopt a standard which may be formally approved at this meeting, serving as a guide for future practice.

CARDIAC MURMURS

Acceptable.

- A. Systolic murmurs, smooth in character (not rough or musical), heard over the second and third left interspaces, during expiration, disappearing during forced inspiration (the heart sounds being normal and clearly audible), should not be considered as a cause for rejection, provided: (1) There is no history of past infection of any character; (2) no personal history of palpitation, breathlessness, pain, giddiness, fainting, exhaustion, or headache; (3) no apparent cardiac enlargement; (4) no abnormal reaction to exertion; (5) no abnormal intensity of the second sound over the second left interspace or third left costochondral junction; (6) no lack of normal heart muscle tone, (7) No abnormal blood pressure; (8) no tachycardia or cardiac arrhythmia.

This class of cases may also be accepted when under forty years of age, where the murmur is heard constantly throughout the entire respiratory cycle, provided the examination has been made by a Home Office representative or an examiner whose ability as an auscultator is known to the medical director.

- B. Systolic murmurs, smooth in character (not rough or musical), heard over the apex usually with maximum intensity, somewhat to the right of the apex, not clearly conveyed toward the axillary line, entirely disappearing at any phase of respiration, standing or in recumbent position (the heart sounds being clearly audible), should not be considered as a cause for rejection, provided: (1) There is no history of past infection of any character; (2) No personal history of palpitation, breathlessness, pain, giddiness, fainting, exhaustion or headache; (3) No

apparent cardiac enlargement; (4) No abnormal reaction to exertion; (5) No abnormal intensity of the second sound over the second left interspace or third left costochondral junction; (6) No lack of normal heart muscle tone; (7) No abnormal blood-pressure; (8) No tachycardia or cardiac arrhythmia.

Not Acceptable:

- (1) Systolic murmurs heard with maximum intensity over the aortic area to the right of the sternum.
- (2) All constant murmurs heard over the apex, or lower half of sternum.
- (3) All murmurs other than systolic.

Dr. Laurence D. Chapin—Dr. Russell's paper is a timely one. During the war the differentiation between important and unimportant circulatory abnormalities acquired new importance. The Government needed every available man for active service but could not afford to waste time and money on the training of the physically unfit. The methods of the War Department in classifying heart murmurs, arrhythmias, and other circulatory impairments are of much interest to us and deserve our careful consideration.

Take first the heart murmurs. As Dr. Russell says, the Government bases its interpretation of these on cumulative evidence, the size and shape of the heart, its rhythm, its response to exercise, the quality, location, transmission, time, and constancy of the murmur. Functional murmurs are grouped into three types, all of which are inconstant, and two of which are present only during certain phases of respiration. These last should not be called murmurs, but rather, pressure sounds, as suggested by Dr. Porter. They are obviously of no significance as far as the heart is concerned. Their occasional association with phthisis, however, should not be forgotten. Observe that the War Department instructions, as quoted by Dr. Russell, warn that "any pathological condition of the apex of the left lung be ruled out."

When it comes to constant murmurs, I do not see how we can let down the bars yet. The British and American War

Departments consider such murmurs in the second and third left intercostal spaces of no significance, if the rest of the cardiovascular examination reveals nothing abnormal. Their examinations are very searching, aided by X-ray, electrocardiograph, etc.—far more severe than we can expect of the average examiner. The report of the British Medical Research Committee on Soldiers' Hearts lays great stress on the history of certain infections, on associated physical signs, and on response to exercise. This may be a satisfactory safeguard for the army, but it is almost impossible for the average medical examiner to rule out surely a history of syphilis, diphtheria, rheumatism, streptococcus, or other infection. Moreover, we are looking ahead twenty or thirty or forty years, when the associated physical signs and response to exercise may be very different. As for constant systolic murmurs at the apex, authorities disagree as to their significance, even when not associated with other abnormalities. This is sufficient ground for rejection of this group for insurance at standard rates.

During the war, I examined a large number of drafted men for a local exemption board. Our instructions from the War Department in regard to heart murmurs were modified several times, until most any kind of a systolic murmur was passed for some kind of military service. It seemed significant to me that our last orders, received shortly before the war ended, were to accept no heart murmur of any kind for any service whatsoever.

I agree heartily with what Dr. Russell says about rate and rhythm, except in regard to intermittency. It is true that premature contractions are abolished by exercise or anything which raises the pulse rate, but the underlying condition is pathological. I do not believe that a person with any kind of heart irregularity, except sinus arrhythmia, at examination, is a first-class risk for life insurance.

Dr. Grosvenor—Dr. Russell's figures of cases cleared by investigation are interesting, and in connection with the same I would say that in our company a record was kept over a short period of time, covering receipt of approximately five thousand

cases, in 320 of which there was a prior symbol for cardiac murmur. These figures are based on original reports and without reference to reexaminations in cases of doubt, or because of a negative report on a case against which a symbol had been placed. In the 320 cases referred to, our examiners reported an organic murmur in 132 cases, an accidental murmur in 46 cases, and negative murmur in 142 instances. In the same series 124 organic and 98 accidental murmurs were reported on cases in which there was no previous record.

I had hoped that from the work of the Military Cardio-Vascular Board, some definite method of interpretation of cardiac conditions might be developed, but do not see that this has occurred.

Various authors appear to differ as to the relative importance of the position of the apex beat, versus that of the left cardiac border as applied to the possible existence of hypertrophy. They also differ greatly as to the character and quality as well as to the localization of supposed accidental and unimportant murmurs. All seem agreed as to the importance of personal history in arriving at a final conclusion, but personal histories as obtained on examinations for Life Insurance are one thing, and those obtained on examination for military service very apt to be another, because of a different mental attitude on the part of the applicant. Besides which, is it not possible that few of us reach adult life without having undergone an infectious process which may have given rise to an endocarditis? Among insurance examiners there is a diversity of practice as to whether the position of the apex beat is determined by the point of maximum impulse, or by the outermost point at which the apex can be palpated or percussed. I have known some examiners to attempt to describe the position of the apex as being at the point where first sounds were heard with the greatest intensity. I think that a decision should be reached as to which of the first two methods is preferable.

Dr. Russell speaks of constant pressure murmurs at the apex and I am constrained to inquire as to on what he considers them dependent, if they are not of cardio-respiratory

character? It would not seem that the fact that a murmur does entirely take the place of the first sound at the apex is sufficient evidence on which to reach the conclusion that the murmur is not organic. In an organic murmur may not the fact that the murmur does, or does not, entirely take the place of the first sound, depend on the degree of the lesion? In contradistinction to the murmur at the apex, heard in the recumbent position, and which nearly disappears on the resumption of the sitting posture, how are we to consider the murmur which is heard in the sitting posture and disappears on recumbency? What leads to the conclusion that the murmur heard just to the right and above the apex is a pressure murmur?

From the most essential standpoint—that of mortality—I have no doubt that MacKenzie is correct in insisting on the lesser importance of mechanical heart defects as compared to that of myocardial change and the matter of cardiac reserve power.

Dr. Russell refers to the necessity of the exercise tests in connection with that of an applicant with a pulse of 50 or below, because of the possibility of heart block. Is the development of an irregularity or of tachycardia expected, if the condition is due to heart block? Are the exercise tests in use by the military examiners applicable to our work and will it be proper to apply the same tests to men in middle life of a sedentary occupation? Our experience would seem to indicate that some men of this class, apparently in satisfactory physical condition, do not return so promptly to normal following exercise; yet this is the class of applicants among which we obtain an unsatisfactory mortality on account of cardio-vascular changes. Can we fix a proper standard?

Should cognizance be taken of the neuro-circulatory-asthenic type of case? It appears that such a condition is seldom noted in civilian life.

To cite a specific case to you gentlemen, who are, perhaps, confronted with similar problems, may be uncalled for, but I am constrained to do so, inasmuch as it is particularly illustrative of the condition with which we are confronted.

354 Twenty-Ninth Annual Meeting

A few years ago our company issued insurance on an applicant with examination by an examiner of average ability, who reported cardiac findings normal. One year later, another examiner examined the applicant, and reported an accidental, pulmonic, basic murmur, and we again issued. Later, the applicant was again examined by a third examiner, who is an examiner for several companies, and who reported an aortic stenosis. The heart was reexamined by two particularly competent examiners, who agreed that there was present a diastolic murmur of aortic insufficiency, notwithstanding the absence of a water-hammer pulse, high pulse pressure, and hypertrophy of the left ventricle. The case was declined.

We were informed that a clinician of special standing was conversant with the applicant's condition and asked for his diagnosis. He advised that the applicant had been under the observation of himself and another clinician of equal standing, now dead, for twenty years; that at the beginning of that period he had suffered from a gonorrhoeal-endocarditis involving the pulmonary valves and resulting in a pulmonary insufficiency with hypertrophy of the right ventricle. He expressed the opinion that inasmuch as the applicant had lived twenty years without subjective symptoms he would be a fair risk for life insurance.

Within six months the applicant was twice accepted by another company for a large amount of insurance, their examiner who first examined the case reporting an unimportant systolic murmur over the pulmonary area. Two other examiners reported the heart negative.

If the Association could evolve an approximately definite method of interpretation of cardiac conditions, I believe it would be of great benefit to the companies represented and in addition would very greatly lessen the jockeying of cases, and enhance the respect of the lay field force for medical officers.

Dr. Hobbs—This article is very opportune and presents a subject which is exceedingly important in connection with the selection of risks for life insurance.

Perhaps some of you have recently noticed in your routine

work an increasing divergence of opinion among different companies in regard to the acceptance of risks with circulatory disturbances.

Formerly, we were obliged to consider the antagonism between the expressed views of the family physician and specialist on one hand, and the opinion of the insurance company on the other. This phase of the question is too old to need comment. The insurance company must consider the medical and actuarial question of mortality among groups, which includes the question of amounts of money involved. The practitioner knows nothing about this phase of the matter.

Now arises a third viewpoint, the attitude of the government as to the acceptance of recruits—enlisted men or drafted men.

We find in an article of the American Medical Association by Dr. George E. Fahr the statement that in a report to Parliament out of 350,000 men discharged and *pensioned* over 10% were for heart disease. There remains but one conclusion: either the selection was imperfect, or the disease was developed after enlistment. Probably in the majority of cases, the lesion existed on entering service, but was disregarded.

As to selection, in "passing" men for service in the United States Army, the intention seems to have been to exclude evident aortic and mitral organic disease, and to accept all others, when there was a cardiac murmur without hypertrophy or symptoms of cardiac trouble. We must remember, however, they were accepting men for a limited period and men who would "stand up" under all requirements. That is not quite the life insurance view, where the risk is carried many years more. I do not believe the government or draft boards were thinking of insurance. Men were wanted, men who could "make good" for short terms.

Now let us look at the "murmur" question, irrespective of the family physician's opinion, or the instructions of the government to draft boards—just from an insurance standpoint.

1st. We may exclude aortic insufficiency and mitral stenosis as being practically uninsurable, although longevity in

the latter disease is greater than in the former. Any well-trained ear can make a diagnosis possible (except in some few instances), when taken in connection with the character of the pulse, blood-pressure, and cardiac hypertrophy. Remember, an aortic regurgitant murmur may be heard in its greatest intensity at the apex. A mitral stenotic murmur, well developed, is heard over the area of the liver.

2d. The murmur of mitral insufficiency is ordinarily not difficult to diagnose. Its situation, transmission, perhaps thrill, are characteristic. When, as is often the case, it is heard all over the precordium, no question can arise. Just here let me say that while blood-pressure and pulse-pressure are valuable in aid to diagnosis, they are not in all cases conclusive. It is possible, although unusual even in aortic insufficiency, to have a normal pulse-pressure. I am convinced that we have not yet arrived at a perfect understanding as to the significance of blood-pressure. We all of course recognize its value in judging risks.

3d. Aortic stenosis is comparatively rare except when it is found in connection with aortic insufficiency. This is conceded, I think, by all authorities, and must be taken into consideration in dealing with basic murmurs.

Just here, a warning that we cannot afford to open the gates so wide as to let organic murmurs be reported as accidental by many life insurance examiners.

4th. Those murmurs which may be open to discussion as to their value in regard to life insurance.

I. Basic systolic murmurs without evidence of organic disease, without hypertrophy.

- (a) We find the anæmic murmur.
- (b) The fairly well localized murmur in young people, probably due to insufficient muscular tone of cardiac muscle.
- (c) Then, in older people, due to the same reason, or aortitis, even slight.
- (d) The murmur produced by a healed lung process through adhesions.

This class of murmurs, *in young people*, I believe in disregarding as any evidence of impairment.

II. Apical murmurs, systolic, not organic.

- (a) The frictional murmur from an old pericarditis, rare, and of little importance.
- (b) The respiratory murmur which should be easily eliminated, with careful examination.
- (c) The questionable "murmur like" sound, systolic, heard with an overacting heart, on examination.

Other conditions being normal, including blood-pressure, such abnormalities are unimportant.

The loudness, softness, or at times absence of murmur, is not always reliable in diagnosis. I have seen this verified often in cases where an autopsy was held.

5th. A word about the pulse, *without cardiac lesion*. In the younger ages, I personally think abnormalities may be dealt with leniently, although this may not be the general practice. A persistent high rate, or an unusual low rate, cannot be viewed with favor. Cases of irregular or intermittent pulse in young people may be taken freely.

The Secretary read the following discussion by Dr. P. E. Tiemann:

Dr. Tiemann—There is no doubt that a murmur does not necessarily mean a lesion, and those of us who have grown gray in the service know very well how irregular some murmurs can be, now plainly heard, now entirely absent, and if they persist are probably the only sign of abnormality in hearts that otherwise respond to every test of soundness. We have also often been impressed by the good physical condition of risks years after they had been accepted as substandard. Many a case of mitral regurgitation applies repeatedly for new insurance, and each time his condition appears unchanged. Then again, we have occasion to examine a policyholder at the expiration of a policy period, and find that the impairment with which he started out has diminished or disappeared. Thus, I remember

358 Twenty-Ninth Annual Meeting

last year a man whom I had reported to have a double murmur twenty years before, but at the second examination one of the murmurs had disappeared and the other was not at all marked. This past summer another policyholder applied for paid-up insurance, whom I had examined in 1898, when he had a systolic murmur at the apex with moderate emphysema and bronchitis. The record showed that in 1905, two examiners at the Home Office found the murmur located over the pulmonic valve. This year the murmur was absent, though I had a colleague, who is very keen at finding murmurs, examine with me. Nevertheless, the subject still had his emphysema, his pressure was 170-120, and the urine showed a trace of sugar. It would have been interesting to know what the blood pressure was in 1898 and 1905, whether it was even then increased or if the rise occurred recently, but we were not taking it then.

Recently one of our city examiners complained to me that more than once, after he had found the applicant to have a murmur, the latter had subsequently been examined at the Home Office, where the heart was pronounced normal, and he was afraid he had been criticized for imagining something which did not exist. I told him that if he heard a murmur, I had no doubt it was there at that time, and also I was confident that the two men at the Home Office were right when they said they could not hear it, and that, because he was surprised, not to say annoyed, at finding a murmur when the heart appeared otherwise normal, was no reason why he should ignore it.

I remember an article by a German professor, relating his observations on the heart of a healthy young woman, who had applied for the position of teacher of gymnastics. He found a loud systolic murmur over the precordium, and the applicant was rejected. He examined her a number of times afterwards, and found the murmur sometimes marked, sometimes indistinct or absent, and eventually he concluded that the murmur was not organic, and the young woman was appointed.

In testing the capacity of the suspected heart, I would like to mention a method first brought to my attention by Dr.

John Lankford, of San Antonio. Of course it would be of value only when conducted by an expert in taking blood-pressure.

"Fortunately we now have a means of determining whether these hearts are diseased or suffering from embarrassed breathing on account of disproportion in size, or from carrying too much weight. My experience now extends over four years' time and hundreds of cases, in testing out the efficiency of the myocardium by blood pressure and exercise combined, and it has impressed me profoundly as being not only accurate but almost infallible. Apply the instrument, take the pressure, let the patient carry the bulb and manometer in his hand, and walk up two flights of stairs, or go through other exercise to a similar degree, and make the test again within thirty seconds; if the heart is free from disease and of normal power, the systolic pressure will jump 25 to 50 millimeters, and will drop back to the starting place in two or three minutes, sometimes one minute. The diastolic will usually remain stationary, but may fall or rise in a very limited way. If the systolic pressure comes back very slowly, occupying many minutes, it is suggestive. If it actually falls instead of rising, the myocardium is in a bad state. It is especially bad if the systolic falls and the diastolic rises, narrowing the pulse pressure, for the heart has no reserve power. It should be remembered that the strong heart of the athlete or any powerful man will require more exercise to produce the same result."

Now it is difficult to believe, when we find in a young, healthy applicant, a systolic murmur, located at the pulmonic area, where the blood-pressure, heart muscle, and heart action all are normal, that the murmur is anything else than what we term functional. The same may be said of the localized systolic murmur at the apex under similar conditions. If we could be sufficiently sure of the skill of our examiners to be confident that their conclusions were correct, we might be justified in ignoring the existence of such murmurs, but any one who has made the rounds of the branch offices and examined the impaired risks that are brought up for review knows that the actual condition is often much less favorable than was reported. I recall one case in particular. This man had been

accepted some months before as an average case of mitral regurgitation, but the agent was not satisfied, and asked me to make a review. The insured at first sight was a magnificent specimen, but in addition to a well-marked mitral regurgitation, he had a decided aortic regurgitation, with the high systolic and low diastolic pressures, typical of that lesion. Yet he was insured as an average case of mitral regurgitation.

There would be a great temptation to crowd the organic murmurs into the ranks of the functional, if the door was once opened to the latter class, and it would be difficult to keep it shut to the others which would claim admission by reason of their close relationship. The experience of the New York Life with the functional murmurs was at first quite unfavorable, but more careful selection has produced a better mortality, but even now the group cannot be classed as standard.

The Secretary then read the following discussion by Dr. J. W. Fisher:

Dr. Fisher—The following data may be of interest to the Association, showing the mortality on accepted risks involving heart cases:

During the years 1906-1917, the Northwestern accepted 770 individuals, where a heart murmur was reported present at some time prior to acceptance or at time of acceptance, but was considered of no significance. Some of these cases had been reported through the Library Bureau, but after repeated examinations by a competent examiner of the Company, the heart had been reported normal; others had been rejected by the Northwestern at some time in the past. We adhered to the following rules, at the time of acceptance, in all cases where a systolic murmur was present:

1. Murmur systolic; heart normal in size; no hypertrophy or dilatation.
2. No accentuation of second pulmonic.
3. Murmur not increased or changed by exercise.
4. Not transmitted beyond nipple line or into axilla.

5. Blood-pressure and pulse reacting promptly and normally to exercise.

6. No history of rheumatism, tonsillitis, or other affection which might cause endocarditis.

7. Examination made by well-known, competent examiner, or at the Home Office.

Of the 770 cases accepted, 575 were under age 40, with 8 deaths, showing a mortality of 67.45%, and 195 cases, ages 40-60, with 8 deaths, showing a mortality of 86.46% by the M.-A. Table. Total 770; Expected 21.11%; Actual 16; Ratio 75.78%, as compared with 80%, the general average of the company by the M.-A. Table.

NORTHWESTERN MUTUAL LIFE INSURANCE COMPANY

MORTALITY EXPERIENCE ACCEPTED RISKS WHERE HEART MURMUR
WAS REPORTED PRESENT AT SOME TIME PRIOR TO ACCEPTANCE
OR AT TIME OF ACCEPTANCE FOR INSURANCE

ACTUAL MORTALITY 1906 TO AUGUST 1, 1917, AS COMPARED WITH
EXPECTED

M.-A. TABLE

MORTALITY BY YEARS OF ISSUE					MORTALITY BY AGES OF ENTRY				
Years	No.	Expected	Actual	%	Ages	No.	Expected	Actual	%
1906	46	3.592	3		16-19	19	.252	0	
1907	49	2.666	2		20-24	74	1.121	0	
1908	48	3.258	2		25-29	172	3.514	1	
1909	42	1.563	2		30-34	174	3.821	3	
1910	55	2.181	4		35-39	136	3.152	4	
1911	58	1.792	1		40-44	87	2.802	2	
1912	78	2.070	1		45-49	70	2.924	3	
1913	64	1.359	1		50-53	22	1.292	3	
1914	68	1.038	0		54-56	11	1.205	0	
1915	96	1.008	0		57-60	5	1.030	0	
1916	99	.473	0						
1917	67	.113	0						
Total	770	21.113	16	75.78	Total	770	21.113	16	75.78

362 Twenty-Ninth Annual Meeting

Dr. Root—There is only one point that Dr. Porter has not fully covered in his very admirable little summary, and that is, the condition of the stomach. I have observed a dozen times or more that it makes a vast difference in working out one of these doubtful cases whether you examine a man on a full or an empty stomach. One risk, a young blacksmith, had a constant, loud, rasping murmur heard all over the cardiac area. I examined him five or six hours afterwards and every trace of the murmur had gone. I had him go to dinner, told him to eat all he could hold, and the thing was repeated three times after a heavy meal. He was extremely muscular, and on an empty stomach his heart was normal, but after a heavy meal he had most astonishing combinations of murmurs. I recollect opening a discussion on the same subject before this Society fifteen years ago, and I want to emphasize the fact which has already been covered that we must avoid allowing the pendulum to swing too far. I heard Professor Christian in Boston, lecturing to the Massachusetts Medical Society, and he stated that he believed that absolutely no systolic murmur of any degree of intensity, whether heard over the cardiac area or behind, conveyed in any direction, had any significance whatever, that it meant nothing whatever in connection with the mitral valve, unless it was accompanied by a presystolic murmur. He backed up his opinion by half a dozen charts, and no one can say that Christian is not a good observer. But let me say that we are not dealing with Professor Christians in the field. We are dealing with the best we can get in the average practitioner and we are going to make a mistake if we turn our examiners loose and allow them to differentiate. It is all very well in the Home Office, where our men are well trained and keep their heads, but you had better look out in the field.

The tellers posted the result of balloting for nomination of officers, as follows:

Nomination of Officers

363

PRESIDENT

DR. THOMAS H. ROCKWELL

1ST VICE PRESIDENT

DR. F. S. WEISSE

DR. A. S. KNIGHT

2ND VICE PRESIDENT

DR. A. S. KNIGHT

DR. T. F. McMAHON

DR. F. S. WEISSE

DR. R. L. ROWLEY

SECRETARY

DR. A. B. HOBBS

TREASURER

DR. C. L. CHRISTIERNIN

DR. A. S. KNIGHT

DR. E. K. ROOT

DR. T. F. McMAHON

EDITOR OF THE PROCEEDINGS

DR. R. M. DALEY

EXECUTIVE COUNCIL

DR. E. W. DWIGHT

DR. G. A. VAN WAGENEN

DR. R. L. ROWLEY

DR. J. ALLEN PATTON

DR. F. G. BRATHWAITE

DR. R. M. DALEY

364 Twenty-Ninth Annual Meeting

Dr. Knight asked that his name be withdrawn as candidate for 1st Vice President and for Treasurer; Dr. Weisse and Dr. Rowley asked that their names be withdrawn as candidates for 2nd Vice President; Dr. Root asked that his name be withdrawn as candidate for Treasurer; and Dr. Daley withdrew his name as candidate for member of Executive Council.

Dr. Hobbs moved that the papers which have been written and read by title be published in the form of a pamphlet, if the writers so desire, and that the writer of each paper be furnished with fifty copies of his paper at the expense of the Association. Motion seconded by Dr. Willard and carried.

SECOND DAY

President W. A. Jaquith in chair. Meeting was called to order. The tellers distributed the ballots for the election of officers for the ensuing year.

Dr. Jaquith—At our fifteenth annual meeting, the late Dr. Marsh read a paper entitled—"Syphilis and Life Insurance." A careful review of the published Transactions of the Association does not reveal that there has been any other discussion of this very important subject excepting for some comment which was made by three members at our Twenty-fifth Annual Meeting in the discussion following the presentation of Dr. McMahon's paper: "The Terms on which Some Substandard Lives may be Insured." We see so many medical reports in which such statements as this appear: "Repeated Wassermann Tests were negative," "Applicant received injections of

Toulmin—Syphilis in Life Insurance 365

salvarsan and has shown no symptoms of the disease since," etc. We all know the mortality results of the M.-A. Investigation showed up very unfavorably. Everything considered, it was felt that a part of one day of our meeting could be very profitably spent in discussing "Syphilis as a Factor in Life Insurance." Four of our members were asked to lead in the discussion and as you have all seen Dr. Toulmin's remarks, I will now call on the others:

SYMPOSIUM: SYPHILIS AS A FACTOR IN LIFE INSURANCE

BY HARRY TOULMIN, M.D.

Medical Director—Penn Mutual Life Insurance Co. October, 1918

I have thought it best to confine my remarks to the experience of my own Company, even though I have referred to it at a previous meeting of this Association. (See abstract of Proceeding Twenty-Seventh Annual Meeting.) It had been the custom of the Penn Mutual to accept certain applicants giving a history of syphilis in the past, in the belief that by exercising great care and limiting those accepted to Endowments to mature about 55, we would have a mortality comparing favorably with the general mortality of the Company.

The following rules were followed:

Acceptable—History of primary, or primary and secondary symptoms only.

Treatment—Continuous for at least eighteen months must have been taken.

At least five years must have elapsed since infection.

Applicant must be a good risk in all other particulars, and either a total abstainer or very moderate user.

Endowments to mature about age 55, only form of issue.

If not a first-class risk in other particulars, or used alcohol

366 Twenty-Ninth Annual Meeting

to excess, or did not take sufficient treatment, or had had tertiary symptoms, the case was declined.

This seemed like super-selection then, and was so very conservative that it was short of rejection only,—we have never had an under-average class, as such.

The study we made was based on cases accepted between 1885 and 1908 (1909 anniversary). There were 408 cards,—245 existing, 130 withdrawn, 33 deaths. Fifteen (15.26) deaths were expected, giving an actual to the expected mortality of 216% measured by the M.-A. Table. (The statement in my remarks at the Twenty-Seventh Annual Meeting that our experience showed an actual to expected mortality of 137.5% on the basis of the M.-A. Table should read—On the basis of the M. H. Table.)

The general mortality of the Company for this same period was approximately 97.7% measured by the M. A. Table.

The mortality at ages under 40, at entry, was 145%; that at entry ages 40 and over—301% of the expected by the M. A. Table. At entry ages 50–54, there were 9 deaths where less than 2 were expected.

The mortality by policy years based on the M. A. Table, all ages combined, was as follows:

1st to 5th Policy year	233.2%
6th to 10th " "	213. %
1st to 20th " "	217. %

The mortality at attained ages, according to the Whole American Table, was as follows:

Attained Ages	Actual Deaths	Expected Deaths	%
15–28	2	1.4	142.9%
29–42	10	10.8	92.6
43–56	14	8.8	159.1
57 & Over	7	3.0	233.3
	33	24.0	137.5

As soon as these results became known we ceased issuing insurance to applicants giving a history of syphilis. As we do not believe that more modern methods of diagnosis and treatment will materially modify the mortality of this class, we consider that applicants with such a history should be treated as substandard risks.

DISCUSSION

The Secretary read Dr. Dwight's discussion as follows:

Dr. Dwight—The Association is again indebted to Dr. Toulmin for a paper showing the experience of his company with those giving the history of having had syphilis. It is particularly interesting for the reason that it gives the rules upon which the Penn Mutual was in the habit of basing its acceptance of such risks and on account of his final statement "As we do not believe that more modern methods of diagnosis and treatment will materially modify the mortality of this class, we consider that applicants with such a history should be treated as substandard risks."

I believe that it is fair to say that the Penn Mutual, like most other companies who had not accurately checked up their results, believed that it was possible to select those with a history of syphilis in such a way as to make them acceptable risks at ordinary rates. So far as I know those companies who have actually tested their results have reached a conclusion not differing widely from that which Dr. Toulmin presents. I believe that every fair investigation which has been made shows the same results and that we are safe in concluding that those giving a history of syphilis, when selected as the Penn Mutual has and as the New England Mutual did, are not safe risks for ordinary insurance and I believe that the mortality experience of all companies, no matter how carefully they have gone at their selection, has been about the same as quoted by Dr. Toulmin.

Thirteen years ago the New England Mutual made its in-

vestigation. Our selection had been about the same as that of the Penn Mutual and our mortality results were a little worse than those which are here given. We stopped accepting such risks and have not since that time knowingly issued policies to risks in this class and yet I cannot but feel that we are making a mistake.

While we are not taking such risks and while I believe that Dr. Toulmin is right when he says that "modern methods of diagnosis and treatment will not materially modify the mortality" I am sufficiently optimistic to believe that sooner or later some of us will find a way by which certain syphilitics can be accepted at standard rates. Just what the method of selection will be I do not claim to know, but I do believe that a way will be found.

About thirteen years ago our company made an investigation of the literature on this subject, covering a period of about forty years. The opinions and statistics which were obtained were gone over very carefully in an attempt to learn of some stage in the disease or some method of classification by which these cases might be accepted. This attempt was a failure. We could not find any time or any age or any condition which appeared to justify the issuing of standard policies to syphilitics and yet I am not satisfied.

I have in mind one thought which ran through all of the literature that was really worth while. One opinion which seems to have been held by most of the really great Syphilographers and one fact which seems to be borne out by the statistics which were given and that was this: *The evil effects of syphilis, so far as it is responsible for the development of definite circulatory and nervous diseases, are dependent upon or associated with civilization, and its resultant mental and nervous strain.* Is it not possible that if we as Medical Directors of Life Insurance companies could in some way base our selection not upon the age of the individual or the duration of treatment but upon the type of individual, his family history, personal history and occupation we might find a method of selection which would be satisfactory?

I believe that such a method of selection is possible. The number and importance of cases would justify a good deal of work and serious thought, if necessary, to accomplish such a result. As it is now we are insuring the liars among the syphilitics and refusing the truthful. As a result we are taking a good many bad risks. If it were possible for us to accept the truthful and throw out some liars it would be for our advantage.

I am calling this matter to the attention of this Association as a suggestion rather than as a definite opinion. My feeling is based upon hope rather than upon facts. As a preliminary to any such method of selection it is important that we should obtain the facts and I should like very much to have those companies which have in the past accepted syphilitics with more or less freedom, whether as standard or substandard risks, make an investigation of their results based upon occupation, residence, whether urban or rural, together with the personal and family susceptibility to nervous, mental, and circulatory disease.

Dr. Eakins—"At least five years must have elapsed since infection" is Rule No. 3 which Dr. Toulmin quoted. Might I ask Dr. Toulmin if he does not think a two year rule would have been much better? Two years for this reason. Eighteen months' treatment plus six months' freedom from symptoms equals two years. Two years subtracted from the five years of the quoted rule gives three years. Which three years represent three extra annual premiums which his company would have received before the passing out of those syphilitics. If syphilis is going to kill it does not elect the period between two and five years from infection to do so; provided, amongst other things, eighteen months' treatment has been directed against it and six months' freedom from symptoms have elapsed thereafter. The killing in those cases is going to be consummated in the forties and fifties.

In brief this is the contention: If (with a decided accent on the if) we are going to accept syphilitics at all, the sooner we do so after treatment and symptom freedom, the better off we are from the viewpoint of premiums received, reserves released,

370 Twenty-Ninth Annual Meeting

and interest earned. To emphasize the "if" a little more definitely I would say that I do not believe any sizable group of real syphilitics can be selected which will not show an extra mortality. That statement is in entire accord with Dr. Toulmin's conclusion that all syphilitics are "substandard" risks.

Dr. Grosvenor—I have very little to say on this subject, for the reason that our experience with applicants with this disease has been very slight. I have looked over the death claims of a few, and only find about fifteen cases of death claims where syphilis is given as the cause of death, and the average life of those policies was six and a half years. We felt that, undoubtedly, as is probably the experience of all, we had cases on the books where we had no knowledge that the applicant has been afflicted with syphilis, and our company came to the conclusion, in 1914, that they were a substandard class of risk, and we discontinued writing insurance on them since that date. The latest reports from the clinics abroad would show that the disease is on a tremendous increase, and that the present and future generation will probably hear from it. We feel that it is possible that with a careful selection some risks might be acceptable—there is no question in my mind but that they are all substandard risks.

Dr. Pauli—I am not prepared to give you the figures of experience of Union Central on syphilis, as the investigations we are making have not been completed. However, the Medico-Actuarial statistics are quite convincing that rigid medical selection by the old methods does not lower the high mortality rate on syphilitics. Syphilis was always regarded as a serious impairment and no case was considered until five years had elapsed since the last symptom of the disease.

Before the Wassermann Test was discovered, applicants with a history of syphilis were limited to Endowments to mature in twenty years, if the infection occurred before the age of forty. In 1910 the rule was changed and syphilitics were limited to Endowments to mature at the age of fifty.

Our next line of thought was that if an applicant had three

negative Wassermann Tests made, the last one within one year of the date of application, he would be considered for \$10,000 on any plan, except Term. It was assumed at that time that three negative Wassermann Tests were sufficient evidence that the syphilitic infection had been entirely cured, especially if the applicant had received an injection of salvarsan. This rule applied from 1911 to 1917. Later scientific investigation, however, proved that this assumption was not true, for the reason that subsequent Wassermann Tests made years later were positive and locomotor ataxia and general paresis developed in such cases. Therefore, this practice was discontinued in January, 1917, and all syphilitics were limited to short Endowments, to mature at age fifty, provided one Wassermann Test within a year of application was negative.

This limitation to Endowments to mature at age fifty was placed to protect the company from most of the parasymphilitic affections, such as tabes dorsalis, general paresis, apoplexy, aneurysm, arteriosclerosis, which usually develop late in life. We fully appreciate, however, that a limitation to short Endowments does not protect the company from the extra mortality at the younger ages, as reported in the Medico-Actuarial Investigation.

At the present time, we discourage our agents whenever possible from submitting applications for insurance on syphilitics, and decline most of them. Only gilt-edge risks who are practically abstainers from the use of alcohol and are not overweighted, and pass first-class examinations, with normal blood pressure and no casts in the urine, are considered for Endowments to mature at age fifty, where the Wassermann Test is negative and five years have elapsed since the last symptom of the disease.

The question, therefore, arises: What is the significance of a Wassermann Test from an insurance standpoint? Is a Wassermann Reaction to be regarded of any value in medical selection?

In latent cases in which there is no clinical evidence of syphilis, the Wassermann Test is positive in only 70% of the

372 Twenty-Ninth Annual Meeting

cases. The negative reaction is not as reliable as the positive test. The fact that the Wassermann Test is negative may merely mean that the infection is latent, but the selection of risks with latent syphilis, who have a negative Wassermann Test, will eliminate more than half of the infected cases, which would be accepted without a Wassermann Test. An applicant with a positive Wassermann Reaction should be declined for insurance.

Self-selection against the Company in syphilis is possible. It is possible for a syphilitic to undergo an intensive treatment for syphilis until the Wassermann Reaction is negative and then apply for insurance. Likewise, a mild diabetic can eliminate sugar in the urine in order to obtain insurance. So self-selection against a company can be practiced in nearly every form of impairment. Such applicants usually apply for low-priced insurance, and will not accept short Endowments. An applicant who purposely misrepresents the facts cannot be detected except through the inspection reports. Nevertheless, an applicant with a history of syphilis should not be accepted without a negative Wassermann Test.

The mortality statistics on syphilis as a factor in life insurance should be revised in the light of more recent laboratory methods of diagnosis, such as the Wassermann Test. They should be divided into two classes: (A) Applicants giving a history of syphilis, with a negative Wassermann Test; (B) applicants, with a history of syphilis, accepted without a Wassermann Test. A thousand cases in Class "A" will undoubtedly show a more favorable mortality than a thousand cases in Class "B." In other words, the Medico-Actuarial Investigation cannot be used as a final criterion for the selection of syphilitics who give a negative Wassermann Test. I believe that a history of syphilis should decline a risk for insurance at standard rates, provided no Wassermann Test is made within one year of examination. On the other hand, an applicant with a negative Wassermann Test could be given consideration, if his weight and habits are good, on short Endowments to mature at the age of fifty.

The *prevalence of syphilis* has been variously stated, some authorities claiming that five to ten per cent of the civil population of this country have a history of syphilis; others from ten to fifteen per cent when based on the result of the Wassermann Test. Of these, the number who confess syphilis is very small. The Northwestern Mutual reports 653 cases of syphilis in 122,000 policies and only one out of 187 acknowledged syphilis—a little more than one half of one per cent. So that every insurance company has among its insured several times as many cases of syphilis as it has any record of. Dr. Osler, in his *System of Modern Medicine*, makes the statement that: "In Paris, out of every one hundred men, at least thirteen to sixteen infected individuals may be counted, and Paris is only mentioned as an example."

Dr. John A. Fordyce, of New York, in his article on neurosyphilis in the *Journal of the American Medical Association*, September 28, 1918, remarks that at the present time, more than any other in the past, the problem is of the gravest importance, as with the return of many infected soldiers, foci of the disease will be established throughout the country that will give rise to its wide diffusion.

Owing to the prevalence of syphilis, it is very important that this question should be given due consideration on the examination blank, and made prominent as a separate question. It should not be included in the usual question: "Have you had any of the following diseases—" including a dozen or more irrelevant diseases of various natures. The examiner merely hurries over the complete list before the applicant has time to think of the answer to the first one on the list.

If the examination blank is sent to the agent before it reaches the Home Office and it is not sent direct to the Home Office by the medical examiner, then the examiner will often neglect to give certain confidential information which he may know. This is especially true of syphilis. It is our practice to require the examiner to forward direct to the Home Office a confidential opinion slip on every risk examined, so that the examiner can enter any information which he or the applicant does not

374 Twenty-Ninth Annual Meeting

desire to appear on the examination blank. We find that this method frequently gives us a clue that the applicant had syphilis, but denied it on the examination blank. Then, too, as a photograph of the examination is made a part of the contract and attached to the policy, applicants object to incorporating such impairments in the photograph of their application.

Usually an applicant will deny that he ever had syphilis and often forgets all about his history more than five years ago, so that any suspicion of syphilis, or any report received of history of syphilis in the past is nearly always regarded as correct and the risk is limited accordingly. The most skillful examiner is unable to detect syphilis which occurred several years previous but a negative Wassermann Test and a careful examination of the pupillary reflexes and the patellar reflexes will exclude an early loss from paresis or tabes dorsalis. Although syphilis affects every organ and tissue of the body, a very small percentage of syphilitics die directly from syphilitic disease. The most fatal forms of syphilis are syphilis of the brain and spinal cord, and syphilis of the heart and blood-vessels.

Syphilis is also one of the chief causes of total and permanent disability. Nervous diseases due to syphilis, such as locomotor ataxia, general paresis, and insanity cause more claims for total disability than any other disease except tuberculosis. Therefore, no policy is issued with total disability clause to an applicant who has a history of syphilis.

There is one danger which is very difficult to avoid, and I believe all of us are guilty of making this same mistake at times. That is, to make exceptions to the rules after they have been established. The agent brings great pressure to bear to stretch the limit. If agents learn that exceptions are made to rules, then it is only a matter of time that we have no rules at all as a guide for the selection of risks. We try to establish the principle that if any exceptions are to be made, it is better to change the rule and then live up to it in our selection of risks.

Dr. Daley—Before proceeding with the discussion of Dr. Toulmin's paper, I should like to lay emphasis on the fact,

which is well known to all members present and that is the relative infrequency with which syphilis appears in the examination papers compared to the frequency of its occurrence in the general population. Investigators have finally laid the blame of this disease upon poor "Lo" and it will probably remain there pending the advent of a champion for the Indian race. When it first appeared in Europe as the *morbus novus et inauditus* of our ancestors, it was respectively blamed upon different nations which then existed there as well as upon the saints and sinners, and while, at the present day, it cannot be considered a new disease, yet, as far as the life insurance examination is concerned, it is so frequently the unheard-of one. Dr. Winstrand reports that the Northwestern Mutual found a history of syphilis 653 times in a series of applications for 122,000 policies, this being about $\frac{1}{2}\%$. The Equitable finds a history of syphilis, taking all sources, M. I. B. as well, in 1.5% of 26,880 policies issued and among the declined applications for the year 1917 the percentage is 1.08%. The smaller percentage of syphilis among the declined cases is undoubtedly due to the salvage of the substandard issue. When we take these figures of one-half to one and one-half per cent and compare them with the figures given in the Surgeon General's Bulletin No. 3, of 20% in the adult male population in the United States between the ages of 20 and 30, and reports by other investigators which have appeared in the medical journals from time to time, showing this frequency in different groups as from ten to twenty-five per cent, the difference is striking and calls for the serious consideration by those in charge of medical selection. Even though the latter figures be based on the presence of a positive Wassermann only, if we eliminate the small per cent of error, a marked difference will still exist; even taking the estimate that syphilis occurs in over 5% of the adult male population of the United States, the extra mortality from this disease is so high as to demand serious attention.

The experience of the Equitable Life Assurance Society, which includes all policies issued between the years of 1885

376 Twenty-Ninth Annual Meeting

to 1915, extended to their anniversaries in 1917, based on approximately 1200 risks, is set forth in the following tables:

	Years	Expected loss	Actual loss	M.-A. per cent
Syphilis the only impairment	1-5	15.608	10	64%
	6	15.856	28	177%
		31.464	38	121%
Syphilis complicated with other impairments	1-5	10.520	19	181%
	6	11.934	29	243%
		22.454	48	214%
All risks with history of syphilis	1-5	26.128	29	111%
	6	27.790	57	205%
		53.918	86	160%

The above figures indicate that syphilis is a disease whose mortality is higher as its duration increases. In other words, the longer the time has elapsed since infection, the greater the mortality will be. This is corroborated by the M.-A. experience as well as the figures showing the experiences of the Gotha of Germany as given by Dr. R. Gollmer.

It will be observed that $\frac{1}{3}$ of the deaths in the above class have occurred during the first five years of acceptance and therefore this is comparatively a large proportion and may account for the lower total mortality, 160, as compared with Dr. Toulmin's figure, 217. Dr. Toulmin's paper does not show the number of deaths in the one to five year class but, as he reports but fifteen deaths altogether, this class must have been a very small size permitting an opportunity for error which might easily account for the difference between 233.2% reported by him and 111% as given above. A re-scrutiny has been made in the above experiences during the first five years to see whether there was any marked fluctuation from year to year in the number of deaths experienced to those expected, but the results were uniform, thus eliminating, to a certain extent, the possibility of error due to size alone, it being a comparatively small class; i. e., but 26.128 deaths expected.

The following table presents the Equitable experience for ages at issue:

AGE GROUPS

Ages at Issue	Expected Loss	Actual Loss	M.-A. per cent
-29	10,647	14	132%
30-39	23,005	42	183%
40-49	15,307	22	144%
50	4,975	8	161%
	53,934	86	160%

The causes of death as they occur in the Equitable's experience show that the deaths from nervous diseases are 3 times, from arterial diseases $3\frac{1}{2}$ times, and the suicides 4 times as frequent as they are in the general mortality of the Equitable.

The Medical Profession depends mainly on the use of two metals, mercury and arsenic, for the treatment of syphilis. In order to do this they must permeate every part of the body yet, after thorough administrations of these, mercury has never been found and arsenic rarely in the spinal fluid. An article by Barbar entitled "The permeability of the Meninges to Arsenic in Paresis and Tabes," *Journal American Medical Association*, January 19, 1918, pages 147 to 148, makes the statement, which is confirmed as far as arsenic is concerned, in a later article "The Circulation of Arsenic in the Cerebro-Spinal Fluid," by Rieger and Solomon, published in the same Journal, July 6, 1918, page 15. It is easily seen, from the foregoing figures, that syphilis from a Life Insurance point of view can never be considered as cured or curable. The higher mortality experienced among those reported cured as the result of thorough treatment over those not thoroughly treated bears this out. Those thoroughly treated undoubtedly had severe infections for the old adage, "When the devil was sick, the devil a monk would be. When the devil was well, the devil a monk

378 Twenty-Ninth Annual Meeting

was he" is well illustrated in the practice of medicine where patients are very apt to discontinue treatment when their conscious and visible symptoms have disappeared, and syphilis is more dangerous when not thus recognized. Also those who realize they were not thoroughly treated are more apt to take a short course of treatment from time to time. These are offered as possible explanations, the main conclusions being that syphilis may never be considered as cured nor can applicants with a history of this disease be accepted at regular rates.

Dr. J. Allen Patton—We have not been able to make a sufficient study of our own experience with insured syphilitics to warrant any statement as to our mortality results. It has been our practice for the past ten or more years to require as complete and reliable a history as we could obtain. The initial lesion must have been at least five years prior to the application, followed by two (preferably three) years of well recognized treatment (including mercury), and then one or more years of freedom from symptoms with no clinical signs at the time of our examination. Approvals, if made, were for Fifteen or Twenty Year Endowment plans, dependent upon the applicant being above or below forty-five years of age, with an increased premium that provided for a mortality of about 150% of that covered by our regular premium rate.

The Medico-Actuarial results would call for a somewhat heavier modification, in many instances, than has been our general practice and though these figures were based upon a relatively small number of cases, yet they deserve careful consideration in estimating the desirability for Life Insurance of any individual with a positive or suspicious specific history.

Usually the syphilis history that is recorded in a Life Insurance report is quite incomplete, being based upon the applicant's actually or intentionally hazy recollections of the initial sore, subsequent symptoms and treatment, which occasionally are supplemented by the attending physician's statement of diagnosis and treatment; the examiner's opinion based upon the necessarily rapid and often unsatisfactory examination he has been permitted to make; and, finally, statements of negative

or positive Wassermann tests coupled with our inability to apply these tests ourselves under proper control. We know that the syphilitic histories given to Life Insurance Examiners are often intentionally incomplete and unsatisfactory, especially if the applicant has had any previous insurance delays, modifications, or rejections because of his specific infection. The clinician, as a rule, obtains a definite history of an exposure followed by the initial sore and secondary or tertiary symptoms and is enabled to apply the recognized forms of treatment, owing to the patient's desire to aid in the diagnosis and his recovery insofar as he is able. The clinical diagnosis depends upon the attending physician's ability to recognize the primary, secondary, or tertiary signs shown by his patient, supplemented by his personal examination if the patient and the microscopical tests for the spirochete with the application of the Wassermann reaction to the blood and spinal fluid.

Gross and microscopical post-mortem examinations of the various tissues have shown us how incomplete has been our use of the clinical and laboratory tests during the patient's life. Positive Wassermann reactions are usually obtained in clinical cases of syphilis, although it has also been generally recognized that positive reactions might be obtained in nonluetic acute infections with high fever.

The results of the test depend more upon the reagents used than upon the methods of the individual or laboratory; hence standardization of the reagents is a necessity for uniformity in the findings or the real value of the reaction.

Gottheil believes that blood examinations have helped in some cases while they have caused a feeling of insecurity in others; that repeated negative widely separated Wassermann Tests, where there has been no symptom of the disease for a long time, are of value; that a temporary reversal of the Wassermann test is common immediately after an antiluetic course, but that the negative reaction should remain after long intervals to be important.

Symmers, based upon the Bellevue Hospital material, concluded (1) that depending upon the antigen used the Wasser-

380 Twenty-Ninth Annual Meeting

mann reaction in the living patient gives a negative result in from 31 to 56% of cases in which the characteristic anatomic signs are demonstrable at necropsy and (2) that the test is positive in at least 30% of cases in which it is not possible to demonstrate any of the anatomic lesions at necropsy. Judging from his results, the test is of doubtful value.

Lambert, using N. Y. Presbyterian Hospital material, concludes that the Wassermann test, properly made, can be relied upon as an important aid in the diagnosis of syphilis.

(1) Cases with anatomic evidences of syphilis on autopsy, gave positive Wassermans in 85.7% in life.

(2) 188 cases showing on autopsy no anatomic evidence of syphilis had given negative Wassermans in life in 93% with both alcoholic and cholesterin antigens.

Bayly says the Wassermann reaction is not specific as it can be absent in florid syphilis and present in other diseases where syphilis is apparently excluded. The spirochete produce a toxin which destroys cells rich in lecithin and cholesterin; these cell destruction products acting as an antigen stimulate the body to produce an appropriate antibody and this is what is sought by the Wassermann reaction. Different laboratories use different techniques and one's positive may be another's negative or another's doubtful; hence standardization is necessary.

A positive Wassermann alone is not sufficient basis for a diagnosis of syphilis, while a negative reaction indicates that the treatment given has been efficient, but one or two negatives are no proof of permanent cure.

Keidel states that properly performed and controlled a positive result means syphilis, while Goodman believes the Wassermann test should be taken in conjunction with, not in place of, other findings.

The spinal fluid Wassermann is positive at the very early stage of luetic involvement of the central nervous system at the time the blood Wassermann is still negative. Provocative Wassermann tests in 103 cases were found of little diagnostic value in active, deep-seated, visceral, osseous, and central ner-

vous system syphilis. Negative Wassermanns are hard to interpret and absence of clinical signs adds to the difficulties. Spinal fluid negative Wassermanns must supplement blood negatives as criterions of cure.

The secondary stage with the spirochete lodged in all the tissues of the body is very difficult to eradicate or cure and clinical results have not yet disproven the old saying that "once a syphilitic always a syphilitic."

Le Compte states that a negative Wassermann is conclusive only (1) when there are no syphilitic signs or symptoms discoverable together with no history of previous infection or exposure to possible infection, or (2) a definite specific history with intensive treatment not succeeded by symptoms and then one negative test does not mean a cure. The following is required (a) negative blood tests at frequent intervals and no symptoms for two years with no antisymphilitic treatment; (b) a negative provocative Wassermann at the end of two years, and (c) negative spinal fluid findings at the end of this time.

Phelps claims that the Wassermann reaction is not yet a sure evidence of syphilis when present and still less against syphilis when absent. Kuhlmann finds that a considerable percentage of syphilitics, with the disease in the latent stage, fail to give positive Wassermanns. Harrison, speaking of a cure, states that one could reasonably give a clean bill of health where all active signs had disappeared and repeated negative tests were obtained at intervals of 3 months during first year and 6 months in second year, the late tests being preceded by use of a provocative dose of 606 and in addition the spinal fluid proving negative.

Heimann estimates there are between 10 and 20 million syphilitics in the United States.

Rountree reports that more than 13% of the patients admitted to the University of Minnesota Hospital in six months had had syphilis and 5% more were not free from suspicion. A survey of 4000 patients admitted to the Peter Bent Brigham Hospital of Boston gave 15% with positive Wassermann evidence of active or latent syphilis.

382 Twenty-Ninth Annual Meeting

Warthin studied 750 autopsies at Ann Arbor during the last ten years and found evidence of syphilis in 300 or 40% of the cases, while Symmers found anatomic evidence in only 6.5% of 4880 autopsies in Bellevue Hospital.

Warthin believes syphilis as a latent infection is more common than is generally supposed and that it is present in 30% of our population. Syphilis after its preliminary invasion tends to become latent, but he has never seen pathologically a *cured* case of syphilis. All cases at autopsy showed active areas of specific inflammation which always means presence of spirochete. Many of these had been without symptoms and with negative Wassermanns showing that the intratissue parasites were for the time being inactive. The syphilitic is pathologically damaged goods and this damage is progressive.

Death is rare in the first two years after infection, but the incidence of syphilitic death increases progressively with the years. It is particularly the cause of death in males from 40 to 60 years of age, its recognition in most cases being masked by myocardial, vascular, renal, hepatic, etc., symptomatology.

Though the case may become clinically cured, it cannot again have the same potential body value and life expectancy as before the infection. The viscera more quickly reach their histogenetic limits and there is a constant strain upon the defensive powers. Life, as in tubercular cases, should be along the lines to prevent reawakening of the spirochete and dependence upon a certain amount of salvarsan or mercurial is not enough.

Active lesions of syphilis with spirochete present have been repeatedly found with negative Wassermanns.

While syphilis tends to become a mild process at any time, the balance between the body and spirochete may become disturbed, the tissue susceptibility or the spirochete virulence become increased and the disease again appears above the clinical horizon. The disastrous effects of syphilitic infection usually require a period of years for their development.

Dr. Ward—The statistics furnished by Dr. Toulmin give additional and valuable data as to the high mortality of those

who have been infected with syphilis. Life Insurance Companies have always recognized the fact that this class was one requiring a most careful selection. Accordingly, they have imposed certain restrictions which it was hoped would enable them to insure carefully selected risks without incurring a high mortality. The Penn Mutual exercised all of these precautions. It insured only those who have had at least eighteen months of treatment; it carried them only to age fifty-five; and it excluded those whose habits as to alcohol were at all objectionable—yet notwithstanding this super-selection, it experienced a mortality of 216% measured by the M.-A. Table. Analyzing Dr. Toulmin's report, we observe that the mortality during the first five policy years was 233.2%, a percentage even higher than that for the entire period. This demonstrates most conclusively the fallacy of hoping to avoid a high mortality by depending upon the early maturity of the policies, for it is strikingly evident that the hazard of this class is not a deferred hazard, beginning at about age fifty or fifty-five as was formerly supposed, but that the hazard is both an immediate and remote hazard. It is well for us to remember that approximately 25% of the deaths from syphilis are caused by diseases of the nervous system.

Some years ago, Erb was able to show the presence of syphilis in 90% of two thousand cases of locomotor ataxia, and since that time Nuguchi has demonstrated syphilis as the causative factor of 100% of the cases of locomotor ataxia and 100% of the cases of paresis. When we remember that the average age of the onset of paresis is from thirty-eight to forty-five, and that almost all of the cases of locomotor ataxia are well developed under age fifty, we can understand why a high mortality has been experienced during the early policy years. We also know that the cases of apoplexy and aortic disease caused by syphilis occur much earlier in life than when these diseases are due to other degenerative causes.

Another fact worthy of our attention is the comparison of the experience of the Penn Mutual to that of the combined experience as shown by our M.-A. Table, Class I D. This

384 Twenty-Ninth Annual Meeting

table comprised those who had surely had syphilis, who had had two years of continuous treatment, one year freedom from symptoms, one attack more than ten years ago. The comparison is as follows:

No. of Entrants—M.-A. Table.....	2855
No. of Entrants—Penn Mutual.....	408
Mortality 1st to 5th Policy Yr. M.-A. Table.....	180%
Mortality 1st to 5th Policy Yr. Penn. Mutual.....	233%
Mortality 6th to 10th Policy Yr. M.-A. Table.....	266%
Mortality 6th to 10th Policy Yr. Penn. Mutual.....	213%
Mortality 1st to 24th Policy Yr. M.-A. Table.....	217%
Mortality 1st to 20th Policy Yr. Penn. Mutual.....	217%

We observe the striking fact that the M.-A. experience for twenty-five years and the Penn Mutual experience for twenty years were identical, both having a mortality of 217%. These figures show that:

1st. Thorough treatment over a long period does not prevent a high mortality.

2d. The mortality is immediate as well as deferred, consequently an endowment policy is not a sufficient protection.

3d. A most rigid selection as to habits and freedom from other impairments does not counterbalance the hazard produced by syphilitic infection.

The question arises as to whether modern methods of diagnosis and treatment will materially reduce the mortality of this class. There is no question as to the value of the Wassermann test and the use of salvarsan, but it is noteworthy that those who were at first most enthusiastic in their estimate of these measures have been obliged by experience to materially modify their views. We realize the uncertainty of the Wassermann test as ordinarily used in affections of the nervous system, and we also know how disappointing the use of salvarsan has been in locomotor ataxia and cerebral syphilis, and how much false reliance has been placed upon it. Syphilis is the greatest scourge of the human race. It is so insidious in its onset, so obscure in its destructive processes, and so fatal in its

results, that we cannot hope to escape a high mortality if we insure those who have been infected with this disease.

Dr. Wehner—In response to Dr. Jaquith's invitation to discuss this paper an attempt was made to collect any information upon syphilis that might be in the Fidelity's files. It was found, however, that all cards dated prior to 1909 were in storage and inaccessible, and that no later statistical data on this subject was obtainable in the company's records. I am obliged, therefore, to simply state some few accepted facts in connection with personal views and my opinion as to the desirability, from an assurance viewpoint, of this distinctly under-standard class.

These views have materially changed in the thirty odd years I have spent in general practice, and any opinion now expressed is the fruition of statistical study, clinical observation, and the experience derived from general routine medical selection, subsequent to the publishing of the report of the Medico-Actuarial Investigation Committee.

Syphilis, owing to its prevalence and morbidity, oftentimes when least expected, always demands most serious consideration. We are aware that many of the conditions given as causes for the termination of life, are frequently but unrecognized clinical endings of prior specific infection, and the long list of maladies involving the brain, the spinal cord, or the cardiovascular renal system are ever before us as are the degenerative processes so often associated with alcoholism, cirrhosis of the liver, suicide, diabetes, nephritis, and even pneumonia. With such a multiplicity of terminations for syphilis and its widely known morbidity, why is it that in assurance selection, so comparatively few cases—such a small percentage of the great number presented, become known to us as understandard risks prior to the presentation of a claim?

Estimates, and not haphazard ones, as to the prevalence of this disease in some of its forms among the general adult population of the United States, range any where from five per cent to twenty or thirty per cent and even higher. In view of this, can we assert the insured classes are always morally superior

386 Twenty-Ninth Annual Meeting

and physically cleaner than the average American group of individuals? Are they freer from animal instincts and accidental contaminations? Or do educational advantages and certain exigencies teach them that "Where ignorance is bliss, 'tis folly to be wise"? In this connection, let me state that in the Philadelphia General Hospital in 1916—4430 Wassermann tests were made of which 1317 or 27.4 per cent were positive, and in 1917 an additional 5110 tests upon blood submitted were performed with positive reactions in 25.9 per cent of the cases. When one considers that it has been authoritatively confirmed that the Wassermann test is negative in 20 per cent of syphilitic cases, the large percentage of positive reactions in this Philadelphia institution gives one thought for reflection.

It is personally believed that approximately almost the same percentage of understandard cases exists in the average insuring class as in the average adult American population, and I must confess, in the absence of any direct or indirect history bearing on this subject which may be elicited or presented on the examination reports or obtained from inspection sources, that my intuitive faculty or sixth sense does not keep many such cases from medical approval. When, however, an understandard suspicion or a syphilitic history is elicited or acknowledged, things are different. A mortality of 139 per cent of the expected, as is so strongly shown by the Medico-Actuarial Investigation—and this mortality in spite of date of infection—approved treatment or non-treatment, coupled with the knowledge that syphilis has the distinction of being an impairment where the remoteness of the original infection adds increasing hazard to the undesirability of a prospect—makes one's gray matter become disturbingly active. We remember that a marked extra mortality has been repeatedly shown to exist where a syphilitic history has been either suspected or found, and were it not for the agent, the case would be summarily declined.

Acting under accepted findings, I firmly believe syphilitic cases cannot safely be handled on life plans. Such cases are distinctly substandard, particularly where secondary or ter-

tiary symptoms have been noted. Such a history means prompt declination. We do not care to further consider the insurability of such an applicant upon any plan, even with lien or rating.

Where, however, the diagnosis has been or is a doubtful one, and the treatment pursued of an approved kind, the prospect under thirty-five or forty years of age, an abstainer, or, at most, a very moderate user of alcohol, if absolute assurance is given that secondary or tertiary symptoms have never been in evidence, and the subject a preferred type in other respects, we might, upon confirmed negative Wassermann tests, issue a rated short endowment. Such plans to mature at approximately fifty or fifty-five years of age. Of course disability benefits would be excluded.

If you will bear with me several moments longer I would like to state a few words regarding Wassermann tests and findings, which I have accepted as valuable working data, and at present look upon as reliable facts.

In 1916 Dr. Randle C. Rosenberger, Professor of Hygiene and Bacteriology in the Jefferson Medical College and Director of the Clinical Laboratory of the Philadelphia Hospital, reported 5106 Wassermann tests; 4430 performed with blood serum and 676 made with the spinal fluid. "Three antigens were used, i. e., first an alcoholic extract of syphilitic liver, second an acetone insoluble lipoid and third a cholesterinized alcoholic extract of beef heart. In the blood specimens submitted 27.4 were positive and in the spinal fluid cases 22.2 were positive. One hundred and thirty-three positive reactions were obtained with the cholesterinized antigen alone."

The doctor further stated: "In a very large number of the total cases no diagnosis was made at the time the serum was sent to the laboratory and no diagnosis of a specific nature was found even after looking up the history sheet in the record room.

"In 1917 an additional 5829 tests were performed making a total of 10,935. As three antigens were used in each case, there were actually 32,805 Wassermann tests performed in the

388 Twenty-Ninth Annual Meeting

two years. The general percentage of positive results during 1917 upon the blood submitted for examination was 25.9 of 5110 cases, while of the spinal fluid 23.6 were positive of 710 specimens examined. This gives an average for the two years of over 25.65 per cent of positive reactions obtained from blood and from the spinal fluid an average of 22.9. In 1917 there were 159 cases in which a positive reaction was obtained with the cholesterinized antigen alone while the luetic and acetone insoluble antigens were negative."

The doctor summarizes his article by stating: "It appears from the whole number of tests performed (10,935) during two years, and the number of specimens giving a positive reaction in cholesterinized antigen alone—292, or 2 per cent, that this antigen should be the one of selection as of especial value in determining the presence of any doubtful syphilitic infection." He further adds: "As mentioned in the previous report (1916) I believe that the Wassermann test is the most valuable aid in the diagnosis of syphilitic infection. More than one antigen should be used for the test as a number of patients showing positive reaction in the cholesterinized antigen alone, would no doubt have been given clean bills of health if only the acetone insoluble and syphilitic liver antigen had been used."

These statements are in line with the experience of Dr. J. A. Kolmer, who, after an exhaustive study and with records of over 15,000 Wassermann tests, feels that when properly performed, this test will respond positively in ninety to ninety-five per cent of all understandard cases. Dr. Kolmer, a man of wide experience and reputation, devotes his entire time to serum work, principally in the laboratories of the University of Pennsylvania and the Polyclinic Hospital. For obvious reasons he is obliged to have the preliminary steps of the tests made by assistants but endeavors to complete them and personally conducts all index readings. He feels that of all the tests used in the Wassermann procedure, the cholesterinized antigen is decidedly the most sensitive, and states that it might, in inexperienced hands, be misinterpreted. He makes this antigen routinely as the first test.

Personally, it is a relief to know that it is quite unnecessary to puncture a vein in obtaining a supply of suitable blood serum for the Wassermann test. A simple $\frac{1}{4}$ inch V-shaped or small semi-lunar incision, made at about $\frac{1}{2}$ inch from the distal end of a finger that has been properly antiseptized and softened by soaking in warm water for a few minutes, causes a flow that may readily be caught in a sterile test tube.

In the future it is likely the Fidelity Company will pay greater attention to the technique of each Wassermann test requested and insist upon a reliable cholesterinized antigen being used.

Dr. Weisse—I can report on our experience on issues of 1885 to 1906—exposed to 1915—men only.

These cases give histories of no treatment for or symptoms of syphilis for four years prior to their application for insurance. The apparently more favorable cases were accepted on the life or life limited plan and the balance on endowment.

In Impairment No. 1—Five out of eighteen deaths were due to degenerative diseases.

In Impairments No. 2 and No. 3 (combined)—Ten out of eighteen deaths were due to degenerative diseases.

In Impairment No. 4—Ten out of seventeen deaths were due to degenerative diseases.

I reviewed all the papers in Impairment No. 4, and while they could not be classed under either Impairment Nos. 1, 2 or 3, there was very grave suspicion of syphilis in practically all of them. In a large number, the applicant stated that he had had syphilis, but the examiner went on to explain how it could not possibly have been syphilis. I think that a large number of these cases would not have been accepted if our present requirements in case of syphilis had been in force: Never any tertiary symptoms or para-syphilis, no symptoms or treatment within two years, two negative Wassermann tests the last provocative, or a provocative Wassermann at the time of examination, the test made by a serologist recommended by our local Medical Referee. Selected cases acceptable on

390 Twenty-Ninth Annual Meeting

endowment plan—only E. 20 under age 35, E. 15, or E. 10 over age 35.

Preliminary investigation of cases falling under Impairments 1, 2, 3, and 4, issue 1907-1914, shows six deaths, two in Impairment No. 1, none in Impairment No. 2 and 3 (combined), and four in Impairment No. 4.

TABLE I

ISSUES OF 1885 TO 1906—EXPOSED TO 1915. DOMESTIC AGENCIES. MEN ONLY. ACCORDING TO THE M.-A. TABLE

MED. IMP. CLASS 1, SYPHILIS, HISTORY OF, SURELY; THOROUGHLY TREATED

POLICY YEARS 1-5						POLICY YEARS 1-30			
All Ages	Entrants	Exposures	DEATHS		Ratio	Exposures	DEATHS		Ratio
			Actual	Expected			Actual	Expected	
Total	176	679	5	4.215	118.5	1,631	18	13.283	135.5

CLASS 2. SYPHILIS, SURELY; NOT THOROUGHLY TREATED, AND

CLASS 3. SYPHILIS, SURELY; NO DETAILS OF TREATMENT GIVEN

Total	134	487	5	3.394	147.5	1,261	18	13.090	137.5
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MED. IMP. CLASS 4. SYPHILIS, HISTORY OF, DOUBTFUL

Total	122	433	9	2.791	322.2	1,121	17	10.556	161.0
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CLASSES 1, 2, 3 AND 4 COMBINED (SYPHILIS)

Total	432	1,599	19	10.400	182.8	4,013	53	36.929	143.6
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CLASSES 1, 2, 3, AND 4 COMBINED (SYPHILIS) LIFE AND LIFE LIMITED

Total	211	793	14	5.010	280.0	2,213	33	21.560	152.8
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CLASSES 1, 2, 3, AND 4 COMBINED (SYPHILIS) ENDOWMENTS

Total	221	806	5	5.390	93.0	1,800	20	15.369	130.2
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TABLE II

ISSUES OF 1885 TO 1906—EXPOSED TO 1915. DOMESTIC AGENCIES. MEN ONLY. DEATHS BY CAUSE WITH THE AGE AT ENTRY AND DURATION

MED. IMP. CLASS 1, SYPHILIS, HISTORY OF, SURELY; THOROUGHLY TREATED

<i>Number Terminated by Death</i>	<i>Age at Entry</i>	<i>Duration in Years</i>	<i>Cause of Death</i>
1	30	4	Typhoid Fever
1	30	12	" "
1	31	9	Chronic Poisoning
1	29	11	" "
1	49	5	Paralysis
1	58	7	Heart Disease
1	39	10	Arteriosclerosis
1	36	12	Pleurisy
1	32	15	Acute Pul. Congestion
1	23	6	Appendicitis
1	48	9	" "
1	30	10	" "
1	41	22	Cirrhosis of Liver
1	48	17	Bright's Disease
1	35	2	Disease of Bladder
1	26	1	Carbuncle
1	31	5	Drowning
1	56	12	Ill-defined
Total 18			

CLASS 2, SYPHILIS, SURELY; NOT THOROUGHLY TREATED, AND

CLASS 3, SYPHILIS, SURELY; NO DETAILS OF TREATMENT GIVEN

1	25	3	Typhoid Fever
1	35	3	Tuberculosis
1	46	14	" "
1	31	10	Cancer
1	52	9	Chronic Poisoning
1	38	3	Apoplexy
1	47	20	" "
1	64	15	Paralysis
1	28	11	Gen'l Paralysis of Insane
1	50	7	Insanity
1	44	7	Endocarditis
1	32	13	Heart Disease
1	50	13	Broncho-pneumonia
1	50	12	Pneumonia
1	46	3	Appendicitis
1	42	2	Bright's Disease
1	35	9	Suicide
1	46	1	Insane (fell from window)
Total 18			

392 Twenty-Ninth Annual Meeting

TABLE III

ISSUES OF 1885 TO 1906—EXPOSED TO 1915. DOMESTIC AGENCIES. MEN ONLY (CONT'D.)

MED. IMP. CLASS 4, SYPHILIS, HISTORY OF, DOUBTFUL

<i>Number Terminated by Death</i>	<i>Age at Entry</i>	<i>Duration in Years</i>	<i>Cause of Death</i>
I	23	I	Influenza
I	28	3	Tuberculosis
I	54	7	"
I	29	7	"
I	30	I	Syphilis
I	51	4	Apoplexy
I	48	3	Softening of Brain
I	47	4	" " "
I	37	4	Paralysis
I	37	7	Gen'l Paralysis of Insane
I	54	5	Heart Disease
I	47	7	Chronic Bronchitis
I	22	3	Appendicitis
I	50	8	Cirrhosis of Liver
I	35	29	Bright's Disease
I	42	8	Suicide
I	25	19	"
Total 17			

Dr. Rogers—Mr. President, Dr. Toulmin's paper adds another valuable bit of testimony regarding this important disease. For a long time I have been satisfied, and I have yet to see evidence to change my views, that syphilis is an impairment which runs through the entire period of life, and the treatment of which, however thorough, does little more than mitigate its severity.

The experience of my own company corresponds very closely with that Dr. Toulmin has just given us, about 140% in carefully selected tables.

We are often urged to be more lenient with these cases on the ground of the favorable results of Wassermann tests. I doubt very much that the Wassermann test has any greater value than to indicate that the person is, at the time of the negative reactions, free from active manifestations of the dis-

ease. I do not believe that negative Wassermanns may fairly be construed any more favorably than that; and I also believe that the testimony of one negative Wassermann is of very little value, one way or another. I am sure that even with the most favorable testimony, life insurance companies will never succeed in securing results that will justify them in treating syphilitics as standard risks.

The Secretary proposed an amendment to the By-Laws, paragraph 7, "Report of Transactions." The first clause of which reads—"No portion of the Transactions of the Association shall be published without the sanction of the Secretary," the proposed amendment to read:

"There shall be a Publicity Committee composed of the President, the Secretary, and the Editor of the Proceedings, whose duty it shall be to determine what portion of the Transactions may be given publicity and to arrange the manner in which this shall be done."

The amendment was seconded by Dr. Knight and carried.

Dr. Toulmin moved that in view of the importance of the discussion of the subject of influenza, the Publicity Committee be instructed to arrange for the publication of a digest of the discussion.

Motion seconded by Dr. King and carried.

Dr. Jaquith—In the notification of this meeting you were requested to come prepared to discuss the effect of the influenza epidemic on your company's mortality and whether any prophylactic measures would be taken.

Considering the importance of the subject, it has

394 Twenty-Ninth Annual Meeting

been arranged with Dr. G. W. McCoy, Director of the Hygienic Laboratory, Public Health Service, Washington, D. C., to address us on the subject of "Influenza Vaccines and Serums." Dr. Frederick L. Hoffman, Vice-President and Statistician of the Prudential Insurance Company, has consented to present some influenza statistics.

It gives me very great pleasure to introduce Dr. McCoy.

INFLUENZA VACCINES AND SERUMS

By DR. G. W. MCCOY

Director of the Hygienic Laboratory, Public Health Service, Washington, D. C.

Dr. McCoy—Gentlemen, it is a privilege to appear before you, and tell you what I know of this subject.

I will dispose of the subject of serums first, because it is the simpler and less important one, and one that can be dealt with pretty definitely.

There is no serum that I know of that is of the slightest value in preventing influenza; nor is there any serum that is of any use whatever in the treatment of the disease. With respect to the influenzal pneumonia (what I have said applies to influenza), there are two serums that come into consideration.

The one is the so-called anti-pneumococcus, Type I, Serum, which has been used with apparently considerable success in ordinary lobar pneumonia which is due to one of the specific types of the lobar pneumonia organism. Now, when this particular organism is the cause, or at least is associated with pneumonia, it might be expected that this particular serum might be of some value. Practically I do not know that there is any evidence to support that view. As I will show a little later, our usual views of etiology, both in influenza and pneumonia, are not as clear as they might be, and so I doubt very much if this serum is useful in influenza-pneumonia.

The other serum, and one that apparently has a reasonably substantial basis, both from the scientific point of view, and from the actual test of experience, is that taken from the blood of people who have recovered from influenza and influenzal pneumonia. So far as I know, this was first tried out at the Naval Hospital in Boston, since then it has been used pretty widely, and there is no doubt whatever in the minds of the Navy medical officers, that the pneumonia which is so often a complication of influenza can be robbed of many of the dangers by the early use of the convalescent serum, that is to say, serum furnished from a person who has recovered from influenza or influenzal pneumonia, and whose temperature has been normal for about a week. The number of cases treated probably now runs up into the thousands, and practically everybody who has used it speaks well of it.

I am rather reluctant to put in my own personal word of caution here. During a rather considerable experience with influenza and influenzal pneumonias in the Emergency Hospital in Washington, we gave a trial to the human convalescent serum and our results were not strikingly good. In going over the work afterwards, we came to the conclusion that we had not used it in large enough doses and had not used it early enough.

Now comes the matter of vaccines. That is not as easily disposed of.

Perhaps we had better have something to say on the etiology of influenza and influenzal pneumonia.

When this epidemic started in Europe perhaps even after it struck us here in the United States, I suppose most of us were pretty well satisfied to believe that the so-called influenza bacillus was actually the cause of this disease. It had been pretty generally accepted for many years, both abroad and in the United States, that these pandemics were due to this particular organism. However, as soon as we began to work with this particular epidemic, considerable doubt was thrown on the relation of this particular bacillus to the influenza, and all of the work which has been done since has served to increase the suspicion as to its etiological relation. We have even gone so

396 Twenty-Ninth Annual Meeting

far as to have cultures of this influenza bacillus sprayed into the noses and mouths and upper air passages in general, of a considerable number of volunteers. We have done that, not only with one culture, but altogether in the neighborhood of twenty, and have used altogether some ten or fifteen people who volunteered for this experiment, but it did not do them a particle of harm; nobody got influenza or anything that even remotely resembled influenza.

There is some other evidence that throws doubt on the relation of this organism to it—it is not found constantly in influenza or influenzal pneumonia. That is perhaps not very strong evidence; but stronger evidence to my mind is the fact that the blood serum of patients or convalescents did not show any significant reaction with this organism, and the organism itself is practically never found in the blood stream, but the strongest evidence is that we failed to reproduce it even in man. Of course before we used it on man we used it on a great number of lower animals, including a large number of monkeys, always with negative results.

The whole subject then of what is the cause of influenza (and a knowledge of the cause is essential) is an open one.

Perhaps some of you have seen the little report which has been published of the work which has been done jointly by the Medical Department of the Navy and the United States Public Health Service, in Boston and in San Francisco. After we failed with the influenza bacillus to produce the disease, we went a step further and we took mucus from the upper air passages of patients acutely ill of influenza. We sprayed that into the throats of healthy people, using altogether twenty or thirty more volunteers, and we never gave anybody influenza even by that procedure. In Boston we went a little further, and actually took the volunteers to the bedsides of the influenza patients, and swabbed the throats and noses of patients, and then transferred the swabs to volunteers, but we never succeeded in producing any effect. This might be considered as knocking the props from under some of our preconceived opinions as to how the disease is carried. At present we do not feel

like going any further than just stating the facts of what has been done. We are going right along with experiments of that sort, and possibly some light will be thrown on it.

There have been some reports of successful and some of unsuccessful inoculation of people with influenza by means of emulsions of secretions which are passed through bacteria-proof filters, but I should rather question the results of those experiments—they have been uniformly negative in our own hands, and at present we do not feel that they have much weight.

When we first began to think of methods of dealing with influenza and realized that it was a very serious and a very deadly thing, and very different from the mild epidemic which swept over Europe early last summer, I suppose everyone's mind turned to the possibility of some bacterial prophylactic, and a bacterial vaccine made from that, similar to the bacterial vaccine made for typhoid, seemed reasonable and logical.

The first reports that came in from the use of that sort of preparations were so optimistic that it seemed that the whole thing was settled. They came from Boston, from a very capable laboratory worker, from Dr. Leary, and attracted so much attention that the Commissioner of Health of Massachusetts, with the approval of the Governor, appointed a commission to pass on this particular vaccine which was being used there. The commission was made up of a Medical Board and a Statistical Board. These two committees sat more or less continuously for a week, and considered all the evidence. It did not make a very satisfactory showing in favor of the vaccine. Here is an example of what was presented to us as evidence: We were told that in a certain institution, among thirty-six employees, eleven had been vaccinated, and one of them had gotten influenza. We found that during the first few days of the influenza in Boston, the twenty-five employees had come down with the influenza; then they vaccinated the remainder. There were eleven vaccinated people who in all human probability would not have come down, because in any group of thirty-six it would be exceptional to have more than twenty-

398 Twenty-Ninth Annual Meeting

five develop the disease. They probably had vaccinated their immunes. I might multiply instances of that sort.

The Board then felt that it should have some experimental work of its own before making a final decision on this thing, and I want to say that I do not know of any position in which it has been harder to keep one's feet on the ground and one's head clear than this matter of vaccine for influenza, because if it did any good at all we ought to know at once. So the Board proceeded to have some experiments conducted by its own members. They made one with a naval group at Pelham Bay which is not far from New York. They had there some 1,300 men. Half of them were vaccinated, and the other half were left unvaccinated. This was before they had any influenza among them, and it is very important that the vaccination should be done before the influenza appears. A few days later they began to come down with influenza, and they came down impartially, although it just happened as a matter of chance that the incidence was somewhat higher among the vaccinated than among the unvaccinated.

Almost simultaneously we put on another group at an institution. This institution had a population of about 1,200 and we vaccinated every alternate person there, and as good luck would have it no one became ill of influenza for almost a week after the vaccination was done, ample time to develop anything that was likely to develop; but when these people began to come down, and the infection did get into the group, they came down just as regularly in one group as in the other, and the total number of infected cases in the vaccinated group was a little larger than in the non-vaccinated.

When we got to this stage we had enough evidence to definitely say that this particular vaccine was not protective. We felt that the figures we had were conclusive on that point.

In addition to this data, however, we were able to get some more. We had furnished in the early stages of the work a considerable quantity of this particular vaccine to a large Army group at Camp Wheeler and a large Navy group in South Carolina, and there they did not vaccinate in just the way we

did—they had done the whole organization. But it so happened that the men were sent from the Naval group in South Carolina to a camp in which influenza was prevalent, and these vaccinated people went up to that camp and got influenza just as quickly as people who had not been vaccinated at all.

That pretty well disposes of the simple vaccine made from the influenza bacillus. It has not proven of any worth whatever.

Now the next vaccine that came to our attention was one which was planned with a little different object in view; and I want to say that the efforts that men have made to produce a vaccine against influenza and pneumonia have all been of the most unselfish sort. The fact that greater success has not followed is not the fault of the men who did the work. The next vaccine is one which it was frankly said probably would not prevent influenza, but would prevent the complicating pneumonia. Well that is the whole thing, if you prevent the pneumonia you have done a great deal. That vaccine was introduced by Dr. Rosenow of the Mayo Foundation, a man of such great reputation and whose name carries such authority that anything he says is entitled to the most serious consideration. Dr. Rosenow made a vaccine that contained not only the influenza bacillus but the whole group of organisms found in the lungs of people with influenzal pneumonia. He reasoned that perhaps he could immunize people against this serious complication but not against the disease itself. What he did was to vaccinate large groups or the greater part of the population of a town, after the influenza had appeared, and apparently the figures looked encouraging—so encouraging that the State of Illinois and the City of Chicago committed these two governing agencies to a most extensive campaign for the manufacturing and popularizing of this vaccine. They were turning out first-class vaccine in a very short time, it was very widely distributed, but unfortunately no control experiments were made, that is, vaccinating half of a group. I happened to be going through Chicago at about that time, on my way to the Pacific Coast, in connection with some of the experiments which I

400 Twenty-Ninth Annual Meeting

have already mentioned, and the authorities of the Health Department of Chicago asked me if I would take some of this vaccine along and possibly find out there a large group in which influenza had not yet appeared. Fortunately I found in California an institution with a group of about 2,000 in which no influenza had appeared. We did not have enough vaccine to inoculate everybody, but about one-half of the personnel who were of the most susceptible age group to influenza, that is, under 41, were vaccinated. That gave us a total of 390 vaccinated, and 390 non-vaccinated. The results again were entirely negative. By almost providential good luck, the infection did not appear in this group, for eleven days after the vaccination was finished, and it could not appear at a better time than that. When it did appear however, it soon became clear that there were as many cases among the vaccinated as among those not vaccinated. There were something over one hundred cases in each group, and there were something like thirty pneumonias in each group, which is about the proper percentage to have, and in each group there were in the neighborhood of eight to ten deaths which is just about what we would expect; so clearly that vaccine did not work.

This evidence was put before the American Public Health Association Meeting in Chicago, in December, and Dr. Rose now, as an explanation of the failure of the vaccine in California thought it was because the vaccine had not been made from local prevailing strains or types of the organisms involved. He felt, and feels yet, that a vaccine to be effective must be made with especial reference to the community in which it is to be used, and such a vaccine may not be applicable elsewhere. He also thinks we may have to adjust the vaccines for different periods in the epidemic, certain organisms appearing in the lungs early, others in the middle period, and others later in the epidemic. Of course that makes it almost impractical to do the thing on a very large scale; it takes too long to get the vaccine done in time to do any good.

I might say that just about a week ago I was in Chicago going over the figures. The Public Health Service is so much

interested in this matter of trying to actually place the value of these vaccines that we spared no trouble or expense to get the data. Going over these figures in Chicago, it was apparently true that this vaccine was pretty successful in Chicago, preventing about three-quarters of the cases, but outside of this community, throughout the balance of the State in general, it did no good. Clearly, there are two possible explanations. The first is, that Dr. Rosenow is right, and that vaccine made in Chicago would not serve anywhere else. I scarcely believe that. But I do think that the vaccination done in Chicago was started after the peak of the epidemic was past, and what they compared as incidence among the vaccinated was the incidence among the whole population—in other words they were vaccinating a selectly immune population, just as they had done elsewhere. In the State, however, the crest of the epidemic was somewhat later than it was in the city, and there they had vaccinated on the upgrade. It was really a severe but perfectly fair and proper test of the efficiency of the vaccine and it had apparently done no good.

Now that pretty well clears up what I have to say about vaccination for pneumonia and influenzal pneumonia. There is another thing that must be kept purely distinct, because it is apparently on a different footing, and I think it is perhaps going to be of considerable value. I speak now of the vaccination against lobar pneumonia which is just as different from the pneumonias of influenza as any two things can be. Even if you find the organisms that cause lobar pneumonia in influenzal pneumonia, you do not have the pathology of lobar pneumonia, in other words, whatever causes the influenza probably also causes the pneumonia. Now there is a vaccine against lobar pneumonia which just at present I imagine is comprising a rather insignificant proportion of all the pneumonias. This vaccine is a comparatively new thing. It is made from the various types of the organisms that cause pneumonia. It was first used in an experimental way, but in a large way, among the miners of South Africa. You probably all know that for many years, they have had the most atrocious epidemics of

pneumonia among the miners of South Africa. A well-known bacteriologist by the name of Lister, working there, proceeded to make a vaccine and he vaccinated the men in a certain mine and in an adjacent mine. In each group the number was so large that it obviated the figures being erroneous, and he found that the pneumonia had almost disappeared from those he vaccinated. The cases that did occur were rather mild. That work of Lister's seems to be well grounded.

The American Army authorities, working under the direction of Colonel Russell, felt that this vaccine ought to be efficient, so they sent a Board to Camp Upton to make an experiment there with this same vaccine. This was long before the epidemic of influenza was thought of in this country. The Board at Camp Upton vaccinated roughly about one-half of each of two divisions there. They called for volunteers, and in some companies 25% volunteered, and in others 75%, but roughly, about one-half of the population. There occurred among the vaccinated group only about one-tenth as many pneumonias as had occurred among the non-vaccinated groups. The figures were so large that there seems to be no possibility of error. That confirms what Lister found in South Africa. The Army has some further data from Camp Wheeler which is not ready for final analysis because the experiment there is still under way, but they have found at Camp Upton that apparently this pneumonia vaccine reduces the incidence very greatly and reduces the severity of the disease when it does occur. That particular vaccine is soon going to be available and I understand the Army is ready to distribute it. The Public Health Service is anxious to get some more accurate data in the use of this vaccine in civil groups. The Army authorities feel that perhaps it is not quite safe or quite fair to apply the findings of these military groups to civil groups, so we have some men out now, endeavoring to make vaccinations of civil groups. It occurs to me that perhaps some Life Insurance Companies have a large enough incidence of deaths from lobar pneumonia among the insured to justify a widespread recommendation of that vaccine but on an experimental basis.

It might do a very great service, that is, if you could in some way vaccinate half the people and leave the other half unvaccinated, supposing the groups were large enough. It would be a mistake in the present stage to vaccinate all of a very large group. I hope I make it clear why this is not advantageous. You have no controls. You cannot tell what would happen in that particular group if vaccination had not been practiced. I think that covers about what I have to say.

Dr. Jaquith—I feel that Dr. McCoy has made a most valuable contribution to our knowledge of this subject. He is an authority, and I believe we have the last word on the subject. Perhaps it would be better before we proceed to ask any questions to have another address by a person who is known to all of you very well by his work, if not known to you individually, and I refer to Dr. Hoffman, Vice-President and Statistician of the Prudential.

Dr. Frederick L. Hoffman—Mr. Chairman and Gentlemen: I wish it were possible for me to say something of real value on the influenza problem. I hoped to be able, at least, to present to you some recent statistical data, but even in that respect my contribution is far from what I would have liked to have made it. The difficulty which confronts the statistician in a matter of this kind is most serious. There is an urgent demand for trustworthy information which, unfortunately, cannot be met in that the thorough and qualified analysis of any and all data requires considerable time. There is no mortality problem that we have ever been called upon to consider which is more complex and in which the conclusions involved are of such a serious nature as in influenza. It may properly be said that much if not most of the information that has been made public on influenza mortality and related matters has done more harm than good; but particularly does this conclusion apply

404 Twenty-Ninth Annual Meeting

to the complex problem of vaccine treatment, which statistically has been dealt with by those incompetent to do so.

I have, for illustration, in my hands a circular just issued by the National Safety Council, an otherwise thoroughly trustworthy and conservative organization, in which it is positively asserted that, on the basis of some 16,000 inoculations, the value of the vaccine treatment is now conclusively established. This statement is issued in good faith by a very conservative employer of labor, representative of one of the largest business corporations in this country.

Now those who have to do with statistics ought to be much more conscious of their serious responsibility and of their duty not to give utterance to any statements which will be accepted by the general public as true and conclusive when, as a matter of fact, they are merely tentative or suggestive of the direction of the research which may possibly lead to the truth.

In the first place, we are confronted by a very practical question. The Massachusetts Insurance Department requires the companies to issue monthly statements of influenza and pneumonia mortality and comparative data of the normal mortality from these two diseases for a year or a like period in the past. Now these requirements raise the question with all of the companies who are transacting business in Massachusetts as to how far they will be able to comply with a request which is one of considerable scientific interest to all concerned. We are confronted by the necessity of adopting a concise definition of influenza for statistical purposes—differentiating between what is influenza, what is pneumonia, and what is influenza-pneumonia, since the difference has not yet been defined within the strict sense of the term. Some definite understanding, however, is absolutely necessary if grossly misleading and erroneous conclusions are to be avoided. There must be some standard of conformity in the analysis of death certificates, conforming as far as practicable to the practice of the Division of Vital Statistics of the United States Census, with which, I am pleased to say, our own methods are made to conform in all essentials. For unless there is reasonable uniformity the

results may be widely at variance and grossly misleading, since some companies merely report deaths from influenza, uncomplicated by bronchopneumonia, whereas others include all deaths from bronchopneumonia, whether complicated with influenza or not, and obviously the results must be widely at variance. Many companies which as yet have but imperfectly developed the statistical methods in the classification of causes of death will find themselves confronted by technical difficulties which can only be solved in the light of a full understanding of what has been done and is being done by the Division of Vital Statistics of the Census, to which, as I said before, our own methods are in close conformity. Any Company in doubt should address itself to the Director of the Division of Vital Statistics, Dr. William H. Davis, Bureau of the Census, Washington, D. C., who will be pleased to furnish all necessary information.

The second difficulty is that many of the death certificates are imperfect and require amplification. For a number of years the Prudential, the Metropolitan, the John Hancock and a number of other companies have sent out thousands and thousands of letters making a supplementary inquiry for the purpose of improving the accuracy and completeness of the death certificates; and for that reason in some respects the statistics of these companies are, as a matter of practical certainty, more useful and conclusive than those of certain other companies who have not followed this practice, even though a large number of supplementary corrections in the death certificate may have been necessary. It is the practice, of course, in most statistical offices to reduce all certificates of death to a single so-called *primary* or leading cause suitable for statistical tabulation and analysis. The secondary or collateral causes of death are obscured in such a practice and they rarely receive proper consideration. Under the so-called Budapest system of death classification, which I first brought before the American Public Health Association at a meeting held in Richmond, some ten or twelve years ago, and the usefulness of which I had myself personally investigated at Budapest, a

406 Twenty-Ninth Annual Meeting

substantial difficulty is overcome by a dual analysis in which a second column is provided for the purpose of disclosing the supplementary or immediately contributory causes of death, frequently of very considerable practical importance.

No disease, it would seem, is more urgently in need of such dual classification than influenza, usually complicated by bronchopneumonia or some other diseases of equal importance. If the present epidemic, for illustration, is rather one of Pneumonia-Influenza than Influenza-Pneumonia, the fact will not be brought out by a single system of death classification. If, as is intimated by Dr. McCoy, the evidence is quite inconclusive that the present epidemic is really true influenza in that the bacteriological evidence of influenza was found insufficient, in a large number of cases, to make the diagnosis practically conclusive, the statistical difficulty becomes obviously much more serious and involved. Whether it would ever be possible to differentiate clearly and precisely in statistical returns as to the deaths from influenza bacteriologically diagnosed as such with absolute accuracy and deaths merely clinically diagnosed as influenza, is, of course, an open question. Bronchopneumonia, complicated by influenza, runs, of course, quite a different course clinically, than bronchopneumonia not so complicated. It therefore seems to me that we ought to consider whether it is not our duty at the outset to adopt a clear-cut definition which will obviate some of the foregoing difficulties and make our statistical data more trustworthy and strictly comparable, especially for insurance department purposes. The fact is frequently overlooked that we have influenza every year, and practically every month of the year in a mild form resulting in a few deaths but rarely assuming epidemic form, and very rarely indeed if ever before reaching the proportions of a nation-wide pandemic as was the case during 1918. Our neglect of influenza in a non-epidemic form is unquestionably one reason why outbreaks in epidemic form usually attain to considerable proportions before measures considered more or less effective are applied to check the further progress of the disease. If we had taken the earlier indications of influ-

enza more seriously we might possibly have adopted more rigid quarantine regulations at the outset which would have prevented the nation-wide spread of the disease. We did, however, entirely ignore the earliest indications, for there was certainly a small epidemic of influenza at Fort Oglethorpe as early as March, 1918, which did not lead to the adoption of national and international quarantine regulations under the direction and control of the United States Public Health Service. There were spasmodic outbreaks during the early part of the year at other camps and localities, so that the general onset of the disease, at the naval hospital at Chelsea, was merely the last link in the chain which connected the slow-rising mortality of the disease with the explosion that reached its maximum point in the week of October 26th.

It was most fortunate that some months earlier the United States Census Office should have adopted a rule under which all of the larger cities make a weekly report of their mortality by wire to the Division of Vital Statistics. The returns are consolidated and made available for the country at large in a convenient form for all ages and for ages under one. Thus from the very outset of the epidemic the Census Office acquired additional information concerning deaths from influenza-pneumonia, with most gratifying results. The prompt response of some 50 cities made the actual situation a matter of record at the seat of government, and no doubt materially facilitated in the proper handling of the Federal quarantine measures necessary or advisable. If it had not been for this action on the part of the Census Office the country would have been entirely without definite information and the nation-wide alarm at the disease would have been greatly and unnecessarily increased.

In appreciation of the service rendered by the Division of Vital Statistics of the Census Office to the cause of disease reporting and quarantine control, it seems to me that this Association might properly adopt a resolution similar to the one recently passed by the American Public Health Association, both in appreciation of the efforts which have thus far been

408 Twenty-Ninth Annual Meeting

made and as an encouragement of a further extension of a measure deserving nation-wide support.

It is regrettable that one should not be able to offer more substantial and conclusive data concerning the epidemic and the lessons learned therefrom with regard to future prevention and control. It is significant that even so thoroughly informed an authority as Dr. Arthur Newsholme, Medical Officer of the Local Government Board of England and Wales, should commit himself to the statement that "I have little hope of success in any personal or public measures against influenza which may not influence the incidence of bronchitis and pneumonia." Thus construed, the problem of influenza control becomes the larger question of the prevention of non-tuberculous respiratory diseases, which have thus far received totally inadequate consideration considering their numerical importance and their pathological significance. It may therefore be suggested that the problem of the prevention and control of influenza epidemics may be most successfully attacked when the disease is not present in epidemic form; in other words, it may be necessary in the future to observe much more carefully than heretofore the earliest rise in the occurrence of deaths from all the acute respiratory diseases. For unless precautions are taken immediately and practically long before the disease attains epidemic proportions, the precautionary measures may be utterly futile, though vast sums of money may be expended in the vain hope of producing drastic results. It is certainly significant that even so cautious and conservative an authority as Dr. Hastings, the President of the American Public Health Association, should be forced to say that perhaps the best way of dealing with the disease is to leave the patient alone!

If that theory should be accepted, then those of us who are interested in strictly preventive measures and who are confronted by the enormously excessive mortality in the recent epidemic as an insurance problem cannot do otherwise than urge in the most serious manner that more attention should be paid to the indications of impending epidemics. As a result of a careful study of the morbidity and mortality curves of all

acute respiratory affections, a large mass of data are becoming available, and much may be learned from a comparative study of the influenza mortality curves of different cities which fail to conform to the single, well-defined normal standard applicable to all. Attention may here be directed to the statistical study of *Epidemic Influenza*, by F. A. Dixey, M.A., D.M., published in Oxford, England, 1892, as an indication of the strictly scientific study of the disease which is so urgently needed at the present time.

The statistics published by the Census Office concerning the recent epidemic reveal some extraordinary differences. The maximum rate, for illustration, during a single week, was attained in the city of Philadelphia, when the rate reached the extraordinary figure of 261 per 100,000 of population. It is almost impossible to realize the true significance of that figure which, if extended in point of time would mean that, if applied to a whole year one-fourth of the entire population of the city would have died from a single cause!

For the country as a whole it is conservatively estimated that there has been not less than 400,000 deaths from influenza-pneumonia. If allowance is made for the normal mortality, or the deaths in this group which would have occurred in any event, irrespective of the epidemic, it is safe to assume that the net mortality excess is certainly not less than 300,000. If that 300,000 is applied to the normal mortality of the country as a whole, about 1,500,000 deaths, it is shown that the normal death rate has been increased by from two to three per thousand, or, approximately, 20%. Complete statistics will not be available for some time to come, but the foregoing estimates are conservative and trustworthy.

The question has been asked as to whether there was anything in the seasonal distribution of the disease which justified the conclusion that there was a similarity between this epidemic and the one of 1889-92, and, second, would such data justify a possible forecast for the future. As far as it is possible to judge, it would seem that there was no similarity in the seasonal outbreak. In England, for instance, the disease

410 Twenty-Ninth Annual Meeting

followed quite a different course during the present epidemic than in any previous epidemic of which the records are available with any thoroughness or completeness. It must be said, however, of the present epidemic that the data are unquestionably more trustworthy and complete as well as scientifically useful, in that they extend over a larger area and a longer period of time. The required analysis of this mass of data involves, however, statistical difficulties of a serious kind. The necessary corrections for wide variations in the age and sex distribution of the population can only be made after the Census returns for 1920 are available. The problem of ascertaining the true significance of the statistical experience cannot be solved by the use of heterogeneous data and the working out of heterogeneous curves. Only homogeneous data and homogeneous curves can be relied upon to present lessons of true significance. It is therefore of the utmost importance that the experience data of every locality should be subjected to a thorough critical consideration and examined with a due regard to all the local facts which may possibly have a bearing upon the exceptional incidence of the disease.

Data for the country as a whole are far less useful than data subjected to thoroughly critical examination for localities where all the facts and circumstances are well understood and within reasonable statistical control. As is well known, the present epidemic reached its maximum point during the week of October 26th. The previous epidemic had three curves extending over three years; the first reached a maximum point of frequency during the first week of January, 1890; the second reached a maximum point of frequency during the second week in April, 1891; the third occurred in the last week in December, 1892. The seasonal incidence of the disease has therefore apparently undergone a complete change during the present epidemic; in other words, we are dealing with an early fall epidemic rather than a winter epidemic as in the former case. The old theory that influenza is a cold-weather disease, and that morbidity or mortality can be correlated precisely to weather conditions falls to the ground in the light of the recent epidemic. Ap-

parently there were no climatological or meteorological factors present in the recent epidemic which have been disclosed by the analysis which has thus far been made. Meteorological changes likely to be responsible for the occurrence of a disease in epidemic form, even though slight, must be pronounced to be within the range of measurability. Perhaps no science has made greater advances than meteorology, and concerning no data are we in possession of more trustworthy information than as regards weather changes, covering practically the entire world. Thus far no evidence has been forthcoming from any source that such changes have been observed to account for the world-wide epidemic affecting practically all sections of the inhabited globe, from the tropics to the Arctic.

If the recent epidemic follows a different seasonal course, it has followed equally a different age distribution, which for insurance purposes is of course of the utmost importance. According to our own statistics, which are confirmed by some statistics derived from general experience, the mortality was excessive at ages 20 to 40. Where we would normally expect about 34% of the deaths from influenza to occur at ages 20 to 40, during 1918, 82% of the mortality from this group of causes occurred at the ages stated. And while normally we would expect about 11% of our deaths to occur during the first year of insurance duration, during 1918, among the deaths from influenza-pneumonia, 18% occurred during this period, so that aside from the extraordinary mortality in general, involving many millions of dollars, we are confronted by the further fact that the influenza mortality fell chiefly upon the most important age period, when the future premium paying liability is, of course, the largest, in other words, the earlier years of policy duration. Or, to be more specific, out of 5655 deaths from influenza-pneumonia at all ages, there were 1124 claims that occurred at a policy duration of less than one year, involving claim payments of \$1,470,129 or 18.6% of the total ordinary claim payments at all durations.

The statistics of any one company are, of course, subject to limitations as regards their application to the problem of in-

fluenza occurrence at large. It may be of interest, however, for me to say that the Prudential paid in seven weeks over 39,000 claims, involving more than eight and one-half million dollars, on account of deaths from influenza-pneumonia.

When the previous epidemic occurred the experience of the Prudential was too limited to be of much value at the present time. In the Ordinary department we had only very recently commenced operations so that our data for that period are inconclusive. Perhaps the most interesting statistics are those of the City of New York for the epidemic of 1889-91. According to our own analysis, 22 per cent of the deaths in that epidemic occurred at ages 15-44, whereas in the 1918 epidemic in New York City 52 per cent of the deaths occurred at this period, or more than twice the previous proportion. The change in the age incidence is therefore clearly established, and is perhaps the one single and most important phenomenon of the recent epidemic. In contrast to the earlier epidemic, which more profoundly affected the period of old age, the present epidemic most seriously concerned the period of middle adult life and was therefore from a public health and from an insurance standpoint of decidedly greater economic and social importance.

Among the lessons which the recent epidemic has taught is our lamentable neglect in not insisting upon the reporting of all serious diseases in private and institutional practice to some central authority. It must be self-evident that the reporting of deaths is insufficient for public health purposes when broader questions are involved. To require the practicing physicians to report all cases in their experience promptly to some central authority is not to insist upon a duty other than as a public necessity. If such a system of reporting cases of illness of acute respiratory diseases had prevailed during 1918 it is a reasonable conclusion that in many cases the epidemic proportions of the disease would have attracted much earlier attention than was the case on the basis of the mortality data alone. For it requires to be considered that in many localities even deaths were not reportable until after ordinances to that effect had been adopted. I therefore leave with you the thought as

to whether it is not entirely appropriate to suggest to the medical profession the inauguration of a movement in favor of the reporting of all serious cases of illness in private practice in precisely the same manner as cases of contagious disease are now reported and deaths from such diseases, in accordance with the rules and regulations of state or local boards of health. The data would not only serve the purpose of directing attention to the earliest outbreaks of diseases in epidemic form, but it would serve the further purpose of providing the first trustworthy collective basis of the morbidity of the population which is now so lamentably wanting.

It has occurred to me also to suggest that possibly the life insurance companies which now transact so vast an amount of business might possibly consolidate their data and transmit weekly reports of deaths by specified causes to some central office similar to the manner in which the Census Office now collects information for some fifty of our principal cities. Aside from this suggestion, however, the much more important one previously made is that the data as such to be comparable should be based upon the same nomenclature of disease and the same system of classification. A new nomenclature of disease is at present in course of preparation by the Census Office in behalf of the Army and the Navy and the United States Health Service. There would certainly seem to be a wide field in which the Medical Departments of life insurance companies could render substantial aid in the furtherance of investigations of this kind, and possibly assist in the solution of some of the most perplexing problems which now concern our public health authorities.

In any event, if the Massachusetts requirement is carried through, for a large number of companies it will become absolutely necessary to initiate thoroughly well-considered methods so that the data may be comparable and not misleading. As Dr. McCoy has shown with reference to vaccine treatment and serum treatment, the whole question involved can be brought into disrepute by perplexing evidence derived from more or less untrustworthy or non-representative statistical sources.

414 Twenty-Ninth Annual Meeting

Finally, I would like to bring to your attention the question of the after-effects of the influenza epidemic and its relation to the future examination of applicants for insurance who have suffered from the disease during the recent epidemic. This is a question which was brought up in England by Dr. Haviland Hall and I make use of this opportunity to read to you a brief abstract of his conclusions. Dr. Hall remarks:

How are we to differentiate between the pulse . . . which is the result of a previous attack of influenza, and that of another person who has had no such attack? The family doctor recognizes at once all of the conditions, but not so the insurance examiner. We are therefore convinced that the influenza has an effect on the myocardium, and that the cases which one sees from day to day, of sudden heart failure, are undoubtedly due in their origin to influenza. . . .

He therefore suggests that the examiner should investigate first the sound of the heart and second the rate of the pulse, to see if there are any signs of heart failure.

I regret that it should not have been possible for me to do justice to this important question, but as I said at the outset, our information is not only fragmentary but inconclusive. Many important questions have been raised, particularly, for illustration, as regards the possible relation of the war to the recent epidemic. In my judgment there is no such relation, for the epidemic has been practically world-wide. There are no reasons for assuming the war has any relation thereto whatever.

The epidemic has re-emphasized the enormous value of life insurance protection on the one hand and of the supreme importance of adequate emergency surplus accumulations on the part of the companies on the other. No legal reserve life insurance company is going to be unable to meet its claims. It is to be hoped that the same conclusion applies to the fraternal and other organizations not in the fortunate position of being able to meet extraordinary demands out of surplus accumulations.

Another thought uppermost in my mind is the increasing importance of all public health measures to life insurance companies. Our position in this respect compared with thirty years ago has been practically reversed. The enormous extent of life insurance, including a vast industrial business, now makes the health interest of the nation practically identical with the health and welfare of the policyholders of the companies. Every question, therefore, concerning a better health administration is one of serious concern to all the companies, and it is sincerely to be hoped that there will be in the future a more active interest in the public health progress of the nation through a close coöperation with the activities of the American Public Health Association. The question was raised at the time as to how it happened that influenza had entered the country and gained such an enormous foothold throughout the nation. In a letter to the *New York Sun*, dated December 12, 1918, there is a call for action against those held responsible for more than 350,000 deaths. Whether there was gross neglect or not, it is certainly to the interest of life insurance companies that the health supervision of the nation and the state should attain to the highest possible degree of efficiency, and that scientific research work should be encouraged in any and every direction, with the end in view that epidemics of such enormity may be brought effectively under public control. Whether that is possible or not is, of course, a matter of conjecture; but it is a certainty that never again will the question be raised that the death rate has reached such low proportions as to preclude any future recurrence of the great epidemics which have devastated the world in the past. The experience of 1916 with infantile paralysis and of 1918 with influenza-pneumonia has taught the world a lesson in humility and contrition. It is sincerely to be hoped that the lesson has been well learned and that hereafter we shall reconsecrate ourselves to a more thoroughly effective sanitary service intelligently adapted to modern needs. In the perfection of such service it is to be hoped that the Life Insurance Companies may be of service as a matter of privilege but also as a right,

416 Twenty-Ninth Annual Meeting

for the adequate protection of the vital interests of their many millions of policyholders and their dependents.

Dr. Jaquith—I am sure we are very grateful to Dr. Hoffman for what he has said. I extend an invitation to all of those present, whether members or not, to ask Dr. McCoy any questions they may see fit. The meeting is open.

Dr. Ward—I would like to ask Dr. McCoy two questions, because they have been submitted to me and I am anxious to have a satisfactory answer. One is in reference to the epidemic in St. Louis. Our attention has been attracted to the fact that the deaths in St. Louis were very few compared to the other cities, and in a circular sent out from a local insurance company this very low death rate was attributed to the extensive use of the Rosenow vaccine to which Dr. McCoy has made reference. I would like to have his opinion.

Further, did I understand Dr. McCoy to say that although the experiment had been made of taking swabs from an infected person and subjecting others to them by swabbing the noses and throats of volunteers, they did not produce the influenza?

I should like also to know whether he has an opinion as to why the epidemic prevailed so extensively among those under forty years of age, with particular reference to whether an attack of grippe, as we formerly knew it, produces an immunity to the disease. Is that a possible explanation?

There is also one more question I should like to submit, either to Dr. McCoy or to Dr. Hoffman, because it has been presented to me by a representative of one of our large local brewing interests. At the recent meeting of the Actuarial Society of America, the President, Mr. Moyer, stated that the fatalities had been greater among the total abstainers than among those who were users of alcohol. Whether that is true, I do not know, or whether either gentleman can give us any light on that particular question.

Dr. McCoy—I have no information on the St. Louis ques-

tion. It had not come to our knowledge that the vaccine had been extensively used there. We will have our representative make investigation.

You are quite right about the transmission experiments. You did understand me to say that we used swabs taken from the acute cases, and used on volunteers, but we failed to produce any influenza. The only explanation we have is, that this disease, like measles, is infective only in the very early stages. We have thought it should be infective as early as twelve hours from the onset of the fever, but it is possible that it is infective only earlier than that; in fact, there seems to be some evidence to indicate that it is only infective before the fever occurs, that a man in the incubating stage may convey it, but once the disease develops the chances of infection are comparatively small.

As to the unduly high incidence under forty, apparently the only satisfactory explanation is that many people older than that have an immunity from previous epidemics. We have no very substantial grounds for believing that this disease is due to the same virus, but it is possible that accounts for the comparative immunity of persons over forty.

As to the mortality among total abstainers as compared with those not total abstainers, I will leave that to Dr. Hoffman.

Dr. Hoffman—I do not want to pose as an expert, but that is precisely one of the illustrations that I had in mind, but did not wish to bring out, as to the danger of using data of restricted value, based on six hundred or seven hundred deaths, as I recall it, which were critically analyzed, and presented to the Actuarial Society. Now if I had been asked to speak on that, I would have refused to do so, because in the first place, the question of abstainers and non-abstainers in insurance represents such a selected group of observations that I have never been able to bring them into conformity with the great moral and physiological problems involved in the mass of the people. Really, however, if this epidemic affected many more young people than old, they were the young people of the present generation among whom habits of abstinence are almost uni-

418 Twenty-Ninth Annual Meeting

versal. It is very difficult to find any large number of young men under thirty, throughout the country as a whole—I am not speaking of a particular section—who are not, broadly speaking, abstainers in the true sense of the term; and, naturally, since they would be overwhelmingly in the majority among the influenza cases, that in itself would account for their preponderance as non-abstainers. I do not believe the statement has any significance whatever.

Dr. Wells—Dr. Hoffman referred to the three epidemics which we have experienced—the first in the first week of January, 1890, the second in the second week of April, 1891, and the third in the last week in December, 1892. You touched on the last epidemic in 1892, in regard to the incident of ages affected. I would like to ask if you could tell us the average ages of those affected in those epidemics.

Mr. Hoffman—I have not the data with me, but that information can be furnished, and can be put into the records of the proceedings.

Mr. Gore—Referring again to Mr. Moyer's paper, he himself made nothing of the data he had received as to total abstainers and non-abstainers, and it seemed to me rather unfortunate that he published what he had, as long as he himself realized that it had very little bearing on the subject; he made nothing of the statistics, and thought them practically without meaning, and they were so regarded among the actuaries.

Dr. King—Dr. McCoy suggested that a vaccine might well be used against lobar pneumonia experimentally throughout the country. Can that material be obtained now, and would you recommend that that be done now, while there is still so much of the epidemic? Would people be confused, in spite of all that we can say, and think we were vaccinating them against broncho-pneumonia? Is it worth while to go ahead at this stage, and vaccinate against the lobar pneumonia?

Dr. McCoy—I think your point is well taken. I doubt if it would be worth while at the present time, because for one case of lobar pneumonia, there are twenty of bronchial. I might say that the Public Health Service has some men at a number

of institutions at which we are trying to vaccinate half of the group. We expect to leave pathologists at each institution, and will make careful examination to determine whether it is bronchial or lobar pneumonia, so that whatever data we will be able to collect will be trustworthy.

Dr. Root—I would like to inquire from Dr. McCoy as to any apparent relation in cause and effect between the epidemic of broncho-pneumonia which prevailed in Manchuria, China, and the Far East, some years ago, and the present recrudescence of pneumonias in this last epidemic. That is to say, whether there is apparently any modification in the type or virus.

Dr. McCoy—My understanding is, that the epidemic of pneumonia you speak of was a plague—pneumonia. That question has been considered with respect to this particular epidemic, that we are now having, and I think I can say with great assurance, that there is no relation between them, excepting the superficial one; that the lungs at post mortem do look considerably like the lungs of the plague, but the plague was a disease on which it was very easy to make a very clear laboratory diagnosis. This is entirely different.

Mr. Gray—I should like to ask Dr. McCoy whether his department is expecting a recurrence of this epidemic, and whether the large number of men in France and Germany at the present time, between the ages of twenty and forty, are likely to be regarded as immune to this disease, because of the experience they have already gone through, or whether on their return to this country, we may expect them to be affected by the conditions that are affecting the present population, and do you, Dr. McCoy, expect a recurrence of this disease, not only this year, but for several years to come? In other words, has the disease worn itself out, as the influenza in 1889, 1890, 1891, and 1892 did? It is a matter which the insurance companies are particularly interested in. If we are going to have a recurrence even to a lesser degree, we should make provision for it. Can you give us any light on that?

Dr. McCoy—I would not like to try to make any prediction.

420 Twenty-Ninth Annual Meeting

If you may judge by the experience of 1889-1891, there will be a recurrence for a couple of years, but it is impossible to make any prediction.

Now, with respect to the returning soldiers, our soldiers over there have been exposed to influenza since as far back as April. The censorship of course kept all this rather in the background until the war was over, but it is well known now that they have had some very severe outbreaks of influenza and influenzal pneumonia. The mortality has not been so heavy as here, but it has been pretty heavy, and the probability seems to be that they have been pretty well exposed over there. They have gone through two epidemics. Beginning in April, influenza of a mild type appeared in our army, and it had already gone through Germany and through the other armies. It was then called the "Spanish Influenza," and is still known by that name. Then in September and October, pretty much in point of time with our epidemic here, there was another epidemic over there. Now what the relation is between those two epidemics, no one can say at the present time.

Dr. Ward—Have the deaths been more prevalent among men than among women?

Dr. McCoy—I cannot say. I do not know that there has been much difference. I think, however, the number of deaths among men has been greater than among women, because so many men have been concentrated in camps, and there is no doubt that in the military and naval camps, the incidence and the death rate have been very much higher than in the civil population—the possibilities for the spread of the infection have been vastly better; but in civil population, judging from what we have seen in several hospitals, I doubt if there is much difference.

Dr. Pauli—I would like to ask Dr. McCoy if he has any explanation of the fact that there is often a recurrence in cases that have had previously an attack of influenzal pneumonia. A man may have one attack and within even one month's time have a second attack, with pneumonia, and the second attack would be just as severe or more severe than the first.

Another question—I wonder if he can explain why influenza in a family will often run through the entire family, the first patient will recover, usually—say the wife has been affected with the influenza, then the husband develops it, and very frequently the second case is more severe than the first case.

Dr. McCoy—There is a good bit of guessing in answering questions like that. With respect to the two attacks, there is a difference in what actually causes the pneumonia. It has been pretty well shown in late years, I think, that lobar pneumonia when it recurs—and a great many people have it a number of times—is actually due to a different organism each time. There are at least four types of the lobar pneumonia organisms, and that individual has been infected with a different one each time, and something of the same sort probably applies to the influenza.

With respect to families, I do not know whether the observation you speak of has been made often enough to lead us to believe that it increases in virulence in the family or not. I rather doubt it. We have noticed one thing, a number of times, and that is, that in certain families it showed a tendency to be very fatal. I happened to come into contact in the last ten days with a family in which a father, mother, and two children died—out of a total of five; and there are a good many like that. In some families, apparently, either the organism is especially virulent, or one of the secondary invaders is especially virulent. Those things occur more frequently than mere coincidence would lead us to believe they should occur.

Dr. Russell—May I ask a question of Dr. McCoy. Is it not so that if the great majority of people had gone to bed and stayed in bed, with the first symptoms of influenza, and had remained there for at least two to three days, after the temperature was normal, that the mortality would have been much less throughout the country?

Dr. McCoy—That seems to be about the one thing on which we can all agree—all the experience points in that direction, that getting to bed promptly and staying there is the very best

422 **Twenty-Ninth Annual Meeting**

treatment, and the patient should stay in bed for at least several days after the temperature is normal.

Dr. Root—I should like to follow one point that is very interesting, namely, of the four types of lobar pneumonia to which you have alluded, and the so-called recurrent attacks of pneumonia, is there any evidence, experimental or otherwise, to indicate that the recurrence of any one of the various types confers any degree of bacillus immunity against that type?

Dr. McCoy—I know of no evidence of that, one way or the other.

Dr. Toulmin—I wish to move that we show by rising, our very deep appreciation of Dr. McCoy and Dr. Hoffman, in coming to address us.

The motion was seconded by Dr. Knight, and carried by a rising vote.

Dr. Jaquith—Representatives of different companies have reports to make on their influenza mortality. I will ask Dr. Porter of the Mutual Life to read his report.

Dr. Porter then read the following Statistical Report, by Dr. Brandreth Symonds, on the Influenza Epidemic as it Affected the Policyholders of the Mutual Life Insurance Company, of New York, in the year 1918:

Symonds—Influenza Epidemic 423

STATISTICAL REPORT ON THE INFLUENZA EPIDEMIC AS IT AFFECTED THE POLICYHOLDERS OF THE MUTUAL LIFE INSURANCE COMPANY OF NEW YORK IN THE YEAR 1918 ONLY

BY BRANDRETH SYMONDS, M.D.

Chief Medical Director

In compiling the following report on the epidemic of influenza there has constantly arisen the difficulty of finding suitable normal standards with which to make comparisons. Fortunately our recent business beginning with the issues of 1907 has been studied apart from the earlier issue, and quite thoroughly. By using these studies for comparison and by eliminating those influenza deaths which occurred in the issue prior to 1907, it has been possible often to institute fair comparisons, and make reasonable deductions, especially with regard to occupations, medical impairments, etc.

Emphasis must be laid on another point too. Owing to the fact that this epidemic has attacked the young lives particularly, it is not fair to say that any occupation, medical impairments, habits, etc., have affected the mortality from influenza favorably or adversely unless the age-incidence of the group under consideration is known. When the average age of the group is young, there will be many deaths from influenza and vice versa. It is only by analyzing these groups according to age-periods that a right perspective of the effect of the epidemic can be obtained.

EPIDEMIC INFLUENZA

The most striking feature among the causes of death is the great increase due to influenza. Ever since the epidemic which started in 1890 the company has had a few deaths annually from this disease. The number has varied from 30 to 70 usually, though in 1916 they amounted to 108 deaths. In the whole registration area of the United States the deaths from

influenza numbered 18,886 in that year. Early in 1918 reports were received from Europe that influenza had assumed epidemic proportions in the Eastern and Central countries. The accounts were vague owing to difficulties in communication but it finally reached the German army on the Western Front and was recognized as very serious. Soon afterward it appeared in neutral and allied countries, and was given the name of "Spanish Influenza" because it was supposed to have spread from Spain, which it had reached through the medium of German submarines. From the allied countries in Europe it spread to the United States arriving at the New England ports in the early part of September. Thence it diffused with great swiftness over the entire United States, as it is highly communicable, especially in the early stages of the disease. It proceeded along the lines of transportation, invading the cities first but rapidly spreading out into the rural districts. It took only a few weeks to reach the Pacific Coast.

The number of deaths in the United States from influenza directly and indirectly has probably amounted to 700,000 so far, and the epidemic has not yet stopped. It reached a maximum toward the end of October and then subsided distinctly, but the fatalities again rose toward the middle of December. They have passed their second maximum, however, which was considerably lower than the first and are again subsiding decidedly at the date of this writing (Jan. 15, 1919).

Among the company's policyholders there were 37 deaths prior to September due to epidemic influenza. Since that time in the last four months of the year 1918 there have been 1431 deaths among the policyholders in the United States and Canada due to epidemic influenza representing 1643 applications for 1828 policies which amounted to \$4,016,000, so far presented to the company. As the death-claims in the United States and Canada are usually presented promptly, it is probable that nearly all of those incurred in 1918 have already been filed, but the epidemic is continuing and deaths on account of influenza are being reported throughout January, 1919, though with less frequency. The date on which

these deaths occurred is well set forth in the chart which accompanies this report.

The black line shows the incidence according to the date of death, which is recorded on the bottom by weeks, one week to each of the larger spaces. The number of deaths is recorded on the side lines, twenty deaths to each of the larger spaces, and two to each small square. It will be noted that the greatest number of deaths (268) occurred during the week ending Oct. 26th. From that point the deaths declined to 138 in the following week ending Nov. 2d. The number of deaths dropped in the next two weeks though more slowly, as there were 66 deaths in the week ending Nov. 16th. Since then the curve has been a good deal flatter, probably due to the fact that some deaths which occurred late in November or December have not yet been reported to the Company. Of the claims which were ordered paid in 1918, the last recorded death occurred on Dec. 21st. Since Jan. 1, 1919, the influenza claims have not appreciably diminished in number below those of December, 1918. Although the peak of the mortality was apparently reached in the end of October, the epidemic is continuing and has not finished its course.

The red line shows the face amount of the policies which became claims by reason of these deaths from influenza, arranged according to the dates of their deaths. Each large square represents \$50,000 and each small one, \$5000. The maximum amount in any one week was \$732,831 which was incurred in the week ending Oct. 26th, coincident with the maximum number of deaths. Prior to this the amount had gone up rather faster than the deaths, owing to some large policies which were caught early in the epidemic. After Oct. 26th, the red line follows the black line quite closely and the same conclusions apply to it.

The following table shows the distribution of the deaths from epidemic influenza by ages and policy years. It will be noted that about 76% of the total influenza deaths occurred below 40 years of age. In the first policy year about 93% of the deaths occurred below 40, although the average age at the issue

426 Twenty-Ninth Annual Meeting

is 28.7 years. In the 2d policy year about 90% occurred below 40. In the 3d to 5th policy years the percentage of deaths below 40 is about 86%. For comparison I have put in the last column the age distribution of all the deaths which occurred in the Company's business in the three years 1915, 1916, and 1917. On comparison it will be seen that the epidemic of influenza is preëminently a disease of the younger ages, about one-third of our deaths occurring below 30, and three-quarters of them below 40, only 128 deaths occurring above 50, a percentage of about 9%.

Epidemic influenza arranged by ages at death and by durations of insurance with the percentages of distribution:

Ages at Death	Total		Policy Year 1		Policy Year 2		Pol. Yrs. 3-5		Pol. Yrs. 6-10		Pol. Yrs. 11-20		Pol. Yrs. 21 & Over		Deaths 1915, 1916 & 1917	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	%	
Und. 20	26	1.7	15	8.0	5	2.7	6	1.6	..	..	..	..	..	..	.3	
20-24	118	8.2	29	15.4	25	13.4	47	12.5	17	4.8	..	..	..	..	1.7	
25-29	310	21.7	50	26.6	60	32.5	105	28.1	88	25.5	7	2.5	..	..	2.5	
30-34	366	25.6	53	28.2	50	27.1	92	24.7	115	33.4	56	19.7	..	..	3.7	
35-39	264	18.5	28	14.9	26	14.1	73	19.5	58	16.8	78	27.5	1	1.8	5.1	
40-44	138	9.6	10	5.3	11	6.0	31	8.3	28	8.1	53	18.7	5	9.1	7.3	
45-49	81	5.7	2	1.1	5	2.7	14	3.7	21	6.1	30	10.6	9	16.4	9.0	
50-54	56	3.9	..	..	1	.5	5	1.3	12	3.5	30	10.6	8	14.6	10.4	
55-59	24	1.7	1	.5	1	.5	1	.3	3	.9	11	3.9	7	12.7	12.1	
60-64	17	1.2	..	..	1	.5	..	..	1	.3	10	3.5	5	9.0	11.0	
65-69	16	1.1	..	..	..	..	..	..	1	.3	1	1.3	11	20.0	10.9	
70-74	7	.5	..	..	..	..	..	..	1	.3	5	1.7	1	1.8	10.0	
75-79	4	.3	..	..	..	..	..	..	..	..	..	..	4	7.3	7.7	
80 & Ov.	4	.3	..	..	..	..	..	..	..	..	..	..	4	7.3	8.3	
Total	1431		188		185		374		345		284		55			

In the previous epidemic of influenza, which began toward the end of 1889 and recurred in 1890, 1891, and 1892 and also in subsequent years when it was endemic, influenza affected the older ages. Dr. Elias J. Marsh, our former Medical Director, in his "Report on the Mortality Records of the Mutual Life from 1843 to 1898," says: "Influenza is a disease of all ages of life but the principal mortality has fallen upon those above middle age, the largest numbers being between sixty and eighty years, as shown in the following table":

Symonds—Influenza Epidemic 427

INFLUENZA

Age of Death	Number of Deaths	Percentage of Total Deaths
20 to 30 years	13	3.3
30 to 40 years	38	9.7
40 to 50 years	69	17.6
50 to 60 years	71	18.2
60 to 70 years	89	22.8
70 to 80 years	81	20.7
80 to 90 years	27	6.9
90 years & upward	3	.8
Total	391	100.0

It will be noted that more than half, 51.2%, of the deaths occurred over 60 years of age while in the present epidemic only 3.4% occurred above 60, and more than half, 57.3%, occurred below 35. This contrast between the two epidemics is still greater when we realize that the proportion of living policyholders above 60 years of age was much smaller 30 years ago than now.

The following table shows the deaths and losses from epidemic influenza according to the duration of the insurance. For purposes of comparison with normal conditions the percentage of deaths and losses which the Company has incurred in the business issued since 1885 is given in the last column. It will be noted that in the 1st policy year, the deaths from influenza were $1\frac{1}{2}$ times the normal, and the losses were $2\frac{1}{2}$ times the normal. In the 2d policy year the deaths from influenza were more than $1\frac{1}{2}$ times the normal and the losses from influenza nearly $2\frac{1}{2}$ times the normal. On account of this short duration and the comparatively young ages at issue, the accumulated reserve on these policies has been small and the net loss to the Company has been very large.

428 Twenty-Ninth Annual Meeting

INFLUENZA DEATHS

Policy Years	Influenza Deaths Reckoned by Applications		Deaths of the Issues of 1885 to 1915
	(1) No.	(2) %	(3) %
1	190	11.6	7.1
2	195	11.8	7.0
3-5	416	25.4	19.1
6-10	418	25.4	26.2
11-20	351	21.4	33.3
21 & Over	73	4.4	7.3
Total	1643	100.0	100.0

INFLUENZA LOSSES

Policy Years	Influenza Losses		Losses of the Issues of 1885 to 1915
	(1) No.	(2) %	(3) %
1	\$630,400	15.7	6.4
2	612,900	15.3	6.9
3-5	948,100	23.6	17.9
6-10	992,000	24.7	24.9
11-20	603,200	15.0	35.5
21 & Over	229,400	5.7	8.4
Total	\$4,016,000	100.0	100.0

The different parts of the United States and Canada seem to have suffered to about the same degree from influenza. It invaded the cities at first and spread rapidly by the ordinary routes of transportation. It soon got into the rural districts

Symonds—Influenza Epidemic 429

and was probably quite as fatal there as in the cities. The percentage of our policyholders who died in the different States varies somewhat, and this is due in part to small numbers. When the States are grouped in fairly large areas as in the subjoined table these inequalities disappear. Column (1) shows the number of deaths from *influenza* in each group of States, and column (2) the percentage. Column (3) has been introduced for comparison, for the number of our policyholders differs markedly in the different areas. Column (3) shows the percentage of deaths among our policyholders in 1915, 1916, and 1917, who resided in the different areas and is a fair index of the distribution of our policyholders in general. It will be noted that (3) and (2) do not differ greatly in any areas and practically coincide in areas 1, 2, 3, and 4. In areas 5 and 6 the excessive proportion of influenza deaths may be due to a larger percentage of younger policyholders. Besides these 1423 there were seven Americans who died in France of influenza and one who died at sea of influenza.

Epidemic influenza deaths by residence at death, with the percentage of distribution:

Area	States	Influenza Deaths		Deaths during the Years 1915, 1916, and 1917
		(1) No.	(2) %	(3) %
1	New England States, N. Y., N. J., Pa., and Del.	485	34.1	37.4
2	Ohio, Ind., Ill., Mich., Wis., Minn., and Iowa.	277	19.5	20.4
3	Md., D. of C., Va., W. Va., No. Car., Tenn., Ky., and Mo.	205	14.4	13.1
4	So. Car., Ga., Fla., Ala., Miss., Ark., La., Okla., and Texas.	212	14.9	14.1
5	Kans., Neb., No. Dak., and So. Dak.	56	3.9	2.2
6	Idaho, Mont., Colo., Wyo., Utah, Nev., N. Mex., and Ariz.	86	6.7	3.5
7	Wash., Ore., and Cal.	61	4.3	6.9
8	Canada.	31	2.2	2.4
	Total.	1423	100.0	100.0

430 Twenty-Ninth Annual Meeting

The influence of weight on the mortality from influenza is set forth in the following table, which is divided into three sections; light weights, medium weights, and heavy weights. At

Ages at Issue	Entrants since 1907	Regular deaths of the entrants since 1907	Influenza deaths of the entrants since 1907
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LIGHT WEIGHT

	(1) %	(2) %	(3) %	(4) No.
15-29	17.6	19.2	14.2	109
30-39	9.3	10.5	7.7	28
40 & Over	6.2	6.4	2.4	2

MEDIUM WEIGHT

	(1) %	(2) %	(3) %	(4) No.
15-29	79.4	78.2	78.9	605
30-39	80.1	77.6	71.2	258
40 & Over	76.0	73.2	67.1	57

HEAVY WEIGHT

	(1) %	(2) %	(3) %	(4) No.
15-29	3.0	2.6	6.9	53
30-39	10.6	11.9	21.1	76
40 & Over	17.8	20.4	30.5	26

height 5 ft. 8, for example, those who weighed 132 pounds or less were counted as lightweights and those who weighed 181

pounds or more were counted as heavy weights. Column (1) shows the percentage of the policyholders who have been insured since 1907 in that age-period in each section. Column (2) shows the percentage of deaths among the policyholders insured since 1907 in each section. It will be noted that in both the lightweight and the heavyweight sections the percentages are higher in (2) than in (1), indicating in a crude way that the mortality is larger than normal in these sections, with the exception of the youngest age-period among the heavyweights. Among the lightweights this excess is due in the main to tuberculosis, but among the heavyweights the acute infectious diseases are quite important in determining the excess in the early policy years. Column (3) shows the percentage of the deaths from *influenza* among the policyholders insured since 1907. That lightweight has been a distinct protection against a fatal termination is shown by the low percentage in column (3). The heavyweights on the other hand show the bad effects of a severe acute infectious disease like *influenza* by the higher percentages in column (3). The *influenza* deaths in the lightweight section numbered 139, in the medium weight section 920, and in the heavyweight section 155.

The effect of influenza in the different occupations seems to depend mainly upon the average age of the policyholders in each. If the occupation calls for younger men, the influenza mortality of the group as a whole will be high and vice versa. Thus the occupations of druggists, teachers, clerks, and students all show a high mortality from influenza, but it is due solely to the fact that these occupations include to a marked degree the younger men. As an example the following table shows the mortality among clerks. It will be noted that the total influenza mortality among clerks is more than normal. When the deaths are divided into age-periods, the influenza mortality in each age-period is good. It is evident that the high percentage of the total is due only to the large number of influenza deaths and this is due to the comparative youth of the class.

432 Twenty-Ninth Annual Meeting

CLASS NO. 224—INDOOR CLERKS

Ages at Issue	Entrants since 1907	Regular deaths of the entrants since 1907	Influenza deaths of the entrants since 1907	
	(1) %	(2) %	(3) %	(4) No.
15-29	6.8	14.3	13.5	104
30-39	2.1	4.9	8.8	32
40 & Over	1.0	2.9	2.4	2
Total	9.8	6.5	11.4	138

The mortality among students was particularly high. The deaths were limited to the age-period, 15-29, and even in that period showed a percentage considerably higher than among the regular deaths in this occupation. It was found that nearly one-half of these influenza deaths occurred in camps and cantonments of the Army and Navy where the influenza epidemic was particularly extensive and virulent.

Where the average age of the occupation was rather high, the total influenza mortality was comparatively low as in ministers, bank officials, merchants, contractors, and factory superintendents. When these classes were analyzed by age-periods, the true facts developed and showed that they suffered as much as usual. Farmers and most occupations with an average age-distribution showed about the average results. Among the metal workers and rolling mill employees, the percentage of influenza deaths was high in the total and at all ages, though the deaths were too few to permit any extended analysis.

It is evident that the age-distribution of any class materially affects conclusions as to the frequency of influenza in that class.

The influence of total abstinence on the mortality due to influenza is set forth in the following table. Column (1) next

to the ages shows the percentage of total abstainers among the policyholders of that age who have been insured since 1907. Column (2) shows the percentage of total abstainers among the dead who have been insured since 1907. It will be noted that the percentages in (2) are uniformly lower than in (1), indicating in a crude way that total abstainers have a lower mortality than the other policyholders. This also has been demonstrated by very elaborate analysis in previous studies. Column (3) shows the percentage of total abstainers among those dead of *influenza* who have been insured since 1907 and who numbered 488. It will be noted that the age-period 15-29 in this column shows a mortality among the influenza deaths which is practically the same as in column (2). The age-periods 30-39 and 40 and over show a slightly higher mortality among the influenza deaths. Total abstinence does not seem to have been of any material help in preventing a fatal termination to influenza at any age.

Ages at Issue	Entrants since 1907	Regular deaths of the entrants since 1907	Influenza deaths of the entrants since 1907	
			(3) %	(4) No.
15-29	49.4	48.0	47.1	362
30-39	31.7	27.6	29.3	106
40 & over	28.4	23.3	23.6	20

Among those who used alcohol daily but never to excess, influenza did not lead to fatal results in any greater proportion than among the other policyholders. In the following table column (1) shows the percentage of those who drank daily but never to excess among the policyholders insured since 1907, and column (2) shows the percentage of these who have died since 1907. The fact that (2) is uniformly larger than (1) indicates approximately that these risks have a higher mortal-

434 Twenty-Ninth Annual Meeting

ity than the average, a fact which has been demonstrated accurately many times. Column (3) shows the percentage of influenza deaths among those policyholders insured since 1907 who drank daily but never to excess. These figures are lower than in (2) and even lower than in (1), showing in a rough way that the daily but not excessive use of alcohol does not conduce to a fatal termination in influenza.

CLASS No. 18—DAILY USER OF ALCOHOL

Ages at Issue	Entrants since 1907	Regular deaths of the entrants since 1907	Influenza deaths of the entrants since 1907	
	(1) %	(2) %	(3) %	(4) No.
15-29	4.9	6.8	4.4	34
30-39	9.1	9.9	6.3	23
40 & over	10.1	11.6	8.3	7
Total	7.4	9.9	5.3	64

Our former Medical Director, Dr. E. J. Marsh, stated that the effect of the previous epidemic of influenza did not end with the deaths from the acute diseases, influenza, pneumonia, and bronchitis but not infrequently lighted up a tuberculosis which terminated fatally after some months and even years. Good authorities hold that the same result will follow in this epidemic. This seems likely on account of the extensive pulmonary involvement which occurs in so many cases. The fact that tuberculosis has occurred in the family, however, does not seem to affect the immediate mortality from influenza. In the following table, column (1) shows the percentage of those policyholders insured since 1907 who had lost one member of the immediate family from tuberculosis, either a parent, a brother, or a sister. Column (2) shows the percent-

Symonds—Influenza Epidemic 435

age of these who died since 1907. As these percentages are higher than in column (1), especially in age-period 15-29, it gives a rough indication that the mortality is larger than the average in this class. Column (3) shows the percentage of the deaths from influenza in this class. These are lower than in (2) except among those over 40 where the number of influenza deaths amounted only to six. It is fair to infer that one case of tuberculosis in the immediate family does not conduce to a fatal termination in influenza.

CLASSES No. 53 & 55—TUBERCULOSIS IN FAMILY HISTORY,
ONE PARENT OR ONE BROTHER OR SISTER DEAD OF

Ages at Issue	Entrants since 1907	Regular deaths of the entrants since 1907	Influenza deaths of the entrants since 1907	
	(1) %	(2) %	(3) %	(4) No.
15-29	3.6	4.9	3.4	26
30-39	5.4	6.2	5.8	21
40 & over	6.9	6.4	7.1	6
Total	4.9	6.0	4.4	53

Different types of blood-pressure seem to have very little effect on the mortality from influenza. Two hundred and fifty-one of the influenza deaths had a record of the blood-pressure at the time of examination. Their distribution, according to the systolic blood-pressure as recorded on millimeters of mercury, is shown in the following table-column (1). For purposes of comparison the same distribution in the deaths among our policyholders who have been insured since 1907 is shown in column (2). The systolic blood-pressures above 135 m. show percentages a little bit lower than the average. This may indicate that a systolic blood-pressure in the upper half of the normal has a favorable influence upon an attack of

436 Twenty-Ninth Annual Meeting

influenza but the differences are not large and the number of cases is small.

Systolic Blood-Pressure in millimeters of mercury	Influenza Deaths	Deaths 1907-1915
	(1) %	(2) %
Below 100	1.2	1.1
100-110	8.8	7.9
111-135	71.6	63.9
136-150	17.9	25.0
151-160	.4	1.6

Out of the 1431 deaths from epidemic influenza, 74 occurred among our women policyholders, occasioning losses which amounted to \$118,800. The average amount is low and, furthermore, the influenza deaths are few compared with men, for these influenza deaths among women number only 5% of all the influenza deaths while women are present among our policyholders to the extent of 7½%. The average age of the influenza deaths among women was lower, being 34.73 years, and the average duration was longer, being 7.50 years.

The losses from this epidemic of influenza have been appalling among the life insurance companies in the United States. In 1918 alone the death-claims paid on this account have been calculated to exceed \$100,000,000, a very conservative estimate, and they are continuing right along into 1919. It seems absurd to think that no methods of prophylaxis have been devised to resist this pestilence except those of ordinary sanitation, hygiene, and isolation. The bacillus influenza which was held responsible for the previous epidemic is no longer regarded as an important factor. It is undoubtedly caused by some germ, and the prevailing theory at present is that this germ is so small that it passes through filters and is beyond the vision in the best microscope. The idea is that without causing any definite lesion by itself it lowers the resistance of the tissues

in the individual attacked, so that the ordinary bacterial fauna of the air passages become ravening carnivora with the development of bronchitis and all varieties of pneumonia, and occasionally an overwhelming general toxæmia.

In order to determine whether any vaccine like those which have been so successful against typhoid fever, paratyphoid fever, etc., had proved to be of any value in the prevention of epidemic influenza, I corresponded with the medical referees of the Company. These number 63 in the United States and Canada and are among the leading practitioners of medicine in each city where a managing agency is located. I sent out a circular letter in December and then checked up the results by a telegram in January. Without going into details the result may be summarized briefly as follows:

No one has any faith in a vaccine of the old bacillus influenza, and most of them had no faith in any vaccine. A few had faith in a mixed vaccine which contains the germs causing the different forms of pneumonia and of bronchitis, but the whole matter must be considered very doubtful and the subject of future experience and research. The faith of these was increasing in January as compared with December and was therefore a prophylactic only against the ordinary fatal complications of influenza.

Dr. Weisse presented the following resolution, which was seconded by Dr. Rockwell, and unanimously adopted:

Resolved, That we approve most heartily of the Weekly Mortality Index of the Division of Vital Statistics of the United States Census, as a most useful aid to the cause of Public Health and Disease Control, and that we give expression to the hope that the Index may in the future be made to include the weekly mortality returns for all American cities having a population of 20,000 or more.

Dr. Jaquith—Dr. Rockwell, Medical Director of

438 Twenty-Ninth Annual Meeting

the Equitable, will continue the discussion on influenza.

Dr. Rockwell—Mr. Chairman and Gentlemen, I have two regrets in offering these rather incomplete notes on influenza: the first regret is the necessity of the occasion for rising to offer them at all; the second is that inasmuch as I am offering something on the subject, that I could not have combined the experience of the Equitable with others, enabling me in that way to get a very much larger experience than it is possible to obtain at this moment from any one company.

Up to September 1st of this year the Equitable had the best mortality it has yet experienced. We were beginning to wonder whether we were not getting it too low for practical business purposes. In the week ending September 21st we began to get our harvest from the severest epidemic in the world's history.

The following shows the increase in percentage of death claims over the corresponding weeks of the previous year:

	Per Cent.
September 22.....	29
October 6.....	111
October 16.....	314
October 30.....	745
November 13.....	419
November 27.....	425
December 18.....	329
December 31.....	269
January 15.....	314
January 22.....	371

In a recent issue of the *London Times* their medical correspondent says: "It seems reasonable to believe throughout the world about 6,000,000 persons perished from Influenza and Pneumonia during the last three months."

Our total death claims reported in 1917 were \$23,062,302, while in 1918 they were \$30,054,052. True, we had a larger exposure in 1918 than in 1917, but our improvement in mortality was so marked that I feel justified in placing our loss due to the epidemic so far at over \$8,000,000.

The following is a comparison of reported death claims, month by month, for the years 1917 and 1918:

Month	1918		1917	
	No. of Cases	Gross Loss	No. of Cases	Gross Loss
January.....	618	\$1,608,154	746	\$2,221,633
February.....	774	2,146,658	763	2,075,680
March.....	837	2,408,279	760	2,189,106
April.....	832	2,102,163	568	1,676,717
May.....	918	2,245,167	794	2,109,138
June.....	658	1,616,992	600	1,993,481
July.....	769	1,848,329	645	1,648,904
August.....	645	1,897,160	704	1,881,629
September.....	647	1,883,212	591	2,269,157
October.....	1,465	3,331,000	612	1,543,650
November.....	2,091	4,464,313	649	1,524,899
December.....	1,913	4,502,625	827	1,928,308
Total claims....	12,167	\$30,054,052	8,259	\$23,062,302

In the 67 companies represented by The Medical Directors' Association, death claims were paid in 1917 to the amount of \$256,170,256. The Equitable's share in that year was over 9%; on this basis these companies alone stand to pay out over \$80,000,000. Add to this all the other regular companies and the fraternal associations in this country and the financial losses of this epidemic are appalling. The sum total will approximate, if not exceed, \$120,000,000, AND THE END IS NOT YET.

While our losses in October, November, and December were about three times the normal (and closely approximates vital statistics generally), our death claims at this time (January 15th) are about 75% in excess of the same month of last year.

It may be of interest for you to know that the epidemic beginning in 1890 showed a mortality in the Equitable from respiratory diseases of a little more than double, and did not return to normal until 1894.

Dr. Douglas Symmers, professor of pathology at Bellevue Medical College, said recently, "There is no doubt that there will be recurring severe epidemics of the disease called Spanish Influenza for several years to come, and that, before we see the end of the pandemic, it will have taken the lives of millions of people. In Switzerland, in Scandinavia, and in Spain, where

the disease raged a year ago, it has returned this year, and there is no reason to suppose that other countries will escape repetition."

Aside from the immediate we are very much concerned regarding the deferred mortality of the disease. In many instances there seems to be a special predilection for the kidney, as shown by the presence of albumin and casts during the illness, for the heart and the resultant effects upon its muscular tissue, on the lung as exhibited by pleurisy, empyæma, and tuberculosis. Certainly not a happy augury for a company's low mortality in the near future.

It is interesting to learn from an analysis of the deaths in what directions the Influenza mortality was particularly felt, whether the deaths were greater among men or women; younger or the older people; were certain sections of the country more seriously affected than others; did certain occupations show a higher death rate? In order to be reliable, answers to such questions should be based on a comparison of deaths with the number exposed, not merely on the relation of the number of deaths in a group to the total deaths.

Dr. Oscar H. Rogers once uttered a word of caution along these lines, and said: "As to the influence upon Medical Selection of the study of Death Losses alone, I should like to say in passing that to my mind no practice is more hazardous. It is no doubt true that a great deal may be learned with regard to moral hazard, speculation, and the like by a review of Death Losses bearing on that subject; but statistics based on Death Losses are worse than useless, because with regard to any group of deaths, we may not know the number of cases contained in the group in which the losses occur. We, therefore, cannot determine the mortality rate sustained in that group. The most probable effect is to prejudice our minds with impressions which may not have any foundations in fact."

The following table is based on deaths alone, as the exposures from which the deaths are derived, are not available. Nevertheless, with proper care we may derive from it useful information:

	Standard Influenza	Other Causes	Sub-standard Influenza	Other Causes
Female.....	8.1%	6.1%	9.3%	5.8%
Male.....	91.9	93.9	90.7	94.2
Age Groups—				
—29.....	23.8	7.2	20.5	13.4
30-39.....	47.5	9.0	51.0	17.2
40-49.....	16.2	16.3	19.2	24.4
50-.....	12.5	67.4	9.3	44.9
Time in Force—				
—1.....	12.6	2.3	18.55	7.6
2-5.....	38.0	12.2	38.4	25.5
6-10.....	23.2	13.4	23.8	23.1
11-.....	26.2	72.1	19.2	43.8
Localities—				
Middle Atlantic.....	40.5%	32.8%	55.6%	46.9%
New England.....	7.5	5.6	7.3	6.3
Middle West.....	21.3	16.1	16.55	15.3
Rocky and Pacific.....	9.3	7.7	7.95	8.5
Southern.....	19.0	17.85	10.6	11.6
Foreign.....	2.4	19.95	2.0	11.4
Occupations—				
Merchant.....	27.7	32.75	27.3	28.9
Wage Earner, 1st Class..	25.6	16.4	17.3	20.2
Wage Earner, 2d Class..	17.0	7.5	30.7	18.7
Physician.....	2.7	2.95	3.3	2.7
Other Professions.....	11.9	11.8	10.7	8.5
Farmers.....	8.8	9.2	4.0	4.8
Housewives.....	4.8	4.3	6.0	3.0
No Occupation.....	1.7	11.8	0.7	7.0

In both standard and sub-standard classes women appear to have given a higher mortality than men.

Younger people seem to have suffered much more than the older. Among the holders of standard policies, for instance, the deaths by age groups:

Ages at Death	—29	30-39	40-49	50-	
Influenza deaths were...	23.8%	45.5%	16.2%	12.5%	of all deaths
Other death causes.....	7.2	9.0	16.3	67.4	" " "

The sub-standard risks show the same trend—heavier influenza fatality among the young.

442 Twenty-Ninth Annual Meeting

From the standpoint of future mortality I regard this fact of serious import. In the epidemic of a quarter of a century ago those who died were older, the insurance had been in force longer, larger reserves had been accumulated, so that the net loss to the company was not so great; yet it took three years to begin to approach normal. The present epidemic seems to be more severe in every way, certainly in its immediate mortality, and we must be prepared to encounter its after effects for several years to come; also, by reason of the younger deaths and short exposure, be deprived of accumulated reserves. The following table demonstrates the deaths during early insurance years:

	1st Year	2d-5th Years	6th-10th Years	11th-
Influenza deaths....	12.6%	38.0%	23.2%	26.2%
Other causes.....	2.3	12.2	13.4	72.1

Apparently, Medical Examination had much less influence in eliminating risks that were soon to become victims to Influenza than in eliminating likely victims to other diseases.

As to locality the epidemic seems to have had little or no preference for any of the large divisions we are accustomed to make—Middle Atlantic, New England, Middle West, South, Rocky Mountains, and Pacific.

Both from Influenza and from other causes we had the greatest number in the Middle Atlantic States, where we have the largest number of policyholders; next come the Middle West and the South, then the Far West and New England. But it would be wrong to deduce from the above figures that the epidemic hit the Middle Atlantic States hardest. For all we know, the Far West or New England or the South may have suffered most; it depends on the number of policyholders exposed, but this information is not available at the present moment. The preceding table shows that in the Middle Atlantic States the Influenza deaths were 40.5% of all the Influenza Deaths, the other diseases 32.8% of all deaths from other diseases. Also, for the other state divisions the Influenza Deaths appear higher.

OCCUPATIONS

"Wage Earners, 2d class," including principally workmen with low compensation, shows a marked increase in mortality. The low Influenza death-rate in the class "No Occupation," is due to the fact that very few young people belong here, and the old "retired" policyholders died from other diseases.

The above analysis is based on 15,767 death claims settled by the Equitable since May, 1917. One thousand seven hundred and three of these claims were due to Influenza and Pneumonia since September, 1918.

According to figures given in the *Spectator* the amount of insurance in force in 1917 in the United States and Canada, in the companies represented by this Association, was \$25,321,860,115. Total number of policies 45,912,059. Realize, if you can, these stupendous figures, then endeavor to conceive the inroads likely to be made in the surplus of all companies, especially the younger ones who have not yet been able to build up a sufficient reserve. Fortunately, the older companies have never been in better condition to stand the increased losses than they are to-day. No problem of greater importance than this epidemic has yet occurred in the annals of Life Insurance, and it should be the duty of every one of us to join most energetically in any sane movement calculated to investigate, alleviate and prevent a recurrence of the scourge.

Do you not think we are bound to assist in guarding and strengthening national vitality? It seems to me that the time has come for life insurance companies, and every organization of life insurance men, not merely to comment, but to GIVE active and effective support to the public health authorities and the great movement that is under way in the interest of public health education generally. The day has gone by when we can afford to give merely passive or academic support to this movement, and we should do so, not only in the interests of our own policyholders and our companies, but in the interests of humanity, to whom both as officials and as pro-

444 Twenty-Ninth Annual Meeting

fessional men we are under obligations to render the highest possible service.

Dr. Russell—In discussing the mortality results of the recent influenza epidemic, it may not be out of place to mention the result of an investigation conducted by Doctor Symonds as to the value of the use of influenza vaccines.

As you are aware, a great deal has been said for and against their value and in order to obtain the consensus of opinion throughout the country, Doctor Symonds communicated with the Medical Referees of the Mutual Life Insurance Company in the different agencies and asked for the result of their experience. Of those so far heard from, 17 had no experience with either the straight or mixed influenza vaccines; of this number, 7 stated that the majority of physicians in their respective cities considered influenza vaccines of any kind of negative value; 4 who had tried only the straight influenza vaccine had obtained no results; 21 had obtained definite positive results from the mixed vaccines, 3 of these had also used the straight vaccine with no results; and 11 considered both the straight and mixed vaccines of no value. Doctor Symonds also communicated with the Surgeon General of the United States Public Health Service, the Surgeon General of the United States Navy, and the Surgeon General of the War Department and he found that they all doubted very much the value of the vaccines. The New York State Department of Health Influenza Commission reported that the influenza vaccine was not effective as a prophylactic. The Committee appointed by the Commissioner of Health of the State of Pennsylvania, consisting of such men as Hobart Hare and McCrae, reports that the vaccines on the market are not advised. In a recent article in the *Journal* of the A. M. A., Rosenow reports very favorable results from the use of his vaccine, and it might be stated that the 9 Medical Referees of the Mutual Life who reported positive results from the mixed vaccines, had used Rosenow's. Rosenow states that the total incidents of influenza and pneumonia are one-third as great as in the uninoculated and the death rate is one-quarter as great, but that it is his opinion that

the immunity conveyed by the vaccine is only of short duration, perhaps less than six weeks. However, these results have not as yet been accepted by other investigators.

If a satisfactory vaccine could have been obtained during the early stages of the epidemic which would have cut down the death rate, even one-quarter, it certainly would have benefited the life insurance companies to have advocated such a vaccine among their policyholders and thus have prevented such enormous losses.

Dr. Jaquith—By invitation we have with us this afternoon Dr. Lee K. Frankel, President of the American Public Health Association, and Vice President of the Metropolitan Life Insurance Company. Mr. Frankel will address us on the subject of the plan and scope of the American Public Health Association in relation to life insurance companies. I take great pleasure in introducing Dr. Frankel.

Dr. Frankel—Mr. President and Gentlemen: It is very kind of you, indeed, and on behalf of the American Public Health Association, I want to thank you for the courtesy which you have extended to the Association, in permitting me to come here this afternoon and address you on the work of the Association.

I imagine that most of you are rather acquainted with the Association at least by name, but you possibly may not be so thoroughly acquainted with what the Association has accomplished, and in particular what it has endeavored to do along the lines of the conservation of life and the extension of human resources.

The American Public Health Association is, approximately, forty-seven years old. It was created at the time when it was felt that there was a great demand in the United States for better health work, and when conditions throughout this country were rather anomalous and almost inchoate. The men

446 Twenty-Ninth Annual Meeting

who brought the Association into existence at that time realized what had to be done along preventive lines, particularly in the reduction and prevention of so-called communicable and preventable diseases. It is a long and continuous history, I might almost say a rather glorious history. It can be safely said that what has been done in the four countries represented by the Association, the United States, Canada, Mexico, and Cuba, has largely been the result of the activities of the men connected with the organization, and primarily the result of the various meetings since the organization came into existence.

The extermination of yellow fever, the practical wiping out of typhoid, the reduction of preventable diseases in general have resulted from the activities of the health officers and others connected with the American Public Health Association. If there has been a reduction in mortality in these years, I think it is fairly safe to say that this reduction has been the result of instrumentalities created by this organization. I hardly need refer, in the presence of men as thoroughly acquainted as you are with the situation, to what has actually taken place, but I am taking the liberty in a few words to give you some idea of what has happened in a period, say, of forty years.

In 1880, the mortality in the registration area, from all causes of death, was 19.8 per thousand. That death rate has been cut down until, in 1916, it was 14.0. The mortality from typhoid fever in the period from 1901 to 1905 was 32.0 per one hundred thousand; in the year 1916, it was 13.3 per hundred thousand. Malaria has gone down from 4.8 in the period 1901 to 1905 to 3.0 in 1916; smallpox from 3.4 to 0.2. To-day smallpox is practically unknown in the United States. The same thing is true of diphtheria and other preventable diseases of childhood, and I hardly need mention to you the remarkable decrease in the death rate among infants.

Now, who has primarily benefited by this work? It is safe to say that it has been the insurance companies of the United States and the large fraternal orders engaged in the insurance business. I think it is safe to say that whatever your actuaries have done in the development of tables of rates upon which

to conduct a safe and sound insurance business, these rates to-day would have been largely useless had it not been for the fact that through the efforts of agencies, entirely outside of the province of the insurance business, this constant reduction in mortality has gone on. I took occasion last summer, at the meeting of the National Fraternal Congress, to mention that the rates of the National Fraternal Congress Table, in their opinion are adequate, and yet I ventured to say that if the mortality of twenty years ago were maintained to-day, notwithstanding all the calculations of the actuaries, their Table of rates to-day would be absolutely useless, and every fraternal order would be insolvent. If that were true of fraternal orders it would be equally true of insurance companies. If the insurance companies have prospered, if they have been able to meet their claims, to keep themselves in solvent situations, if they have been able to lay up reserves against the period of emergencies, it is primarily due to the fact that the American Experience table, dating back to 1867 or 1868, to-day is more than ample, not by reason of any change in the table, but by reason of this very marked reduction that has taken place in the general mortality of the United States; and it seems to us, therefore, that if the insurance companies are the organizations that have especially benefited by these activities of the American Public Health Association and the men interested in it, it is the business of the life insurance companies to come along and play their part in the work that is being undertaken in the development of better public health in the United States.

Now the Association is composed almost entirely of public health men—by that I mean, representatives of state health departments, and officials of municipalities, counties, townships, cities, towns, whatever they may be. They are men of every type and condition. One of the particular functions of this organization is to train and equip better health officers. Among its activities is the attempt that has gone on for a number of years to obtain full-time health officers in every community and in every State. It is surprising that even at this late date, there are even State health officers on part-time

448 Twenty-Ninth Annual Meeting

basis. We are endeavoring to educate and train a better group of health officers, men competent to undertake the very important and frequently onerous tasks that fall to them, and yet we have the anomalous situation in the United States to-day, that the average salary paid to a health officer is less than one thousand dollars. I presented a paper in Chicago at the last meeting of the American Public Health Association, in which I cited certain figures I had collected in the last six months showing the salaries of health officials, and you would be astonished to learn that the average man is getting less to-day than the butcher in your town. The average stenographer whom you are employing, if she is competent, can make twenty-five dollars a week, which is more than the health officer is being paid. The result is that we are having inefficient health administration, that we are still having communicable and preventable diseases prevailing in communities where they should be wiped out; and yet on the other hand, we have had some remarkable achievements. Take for example, the city of Cincinnati with a terrific typhoid rate running along for several years. Under the activities of the health department, the city was practically compelled to install a filtration plant, with the result to-day that the city of Cincinnati, notwithstanding the fact that it is situated on the Ohio River and using Ohio River water, has the lowest typhoid rate of any city in the United States. What does it mean to us and to you? It means that year by year you are saving money by reason of the fact that that typhoid fever rate is being reduced, that you are not paying typhoid fever claims, that you are able to estimate a table of mortality that will enable you to lay up surplus, to cut down your claims year by year; that these things that are going on are constantly and immediately helping the funds and finances of the insurance companies of the United States.

More recently it has been determined to carry on a much more ambitious program. It has been determined that this Association shall not function merely the one week in the year at the time of its annual meeting, although that in itself has been a meeting devoted to the consideration of important

health problems, and the papers read have gone out to the world at large and have been adopted as a standard by health officers everywhere; but the time has arrived when the Association ought to grow, it ought to have the machinery at its disposal to act year in and year out and carry on this thought of preservation of life, disease prevention, and death reduction, into the highways and byways of this and other countries, and for that reason we are hopeful that we shall be able to establish a piece of machinery adequate and sufficient to function throughout the year, instead of at any particular time of the year. Among other things we are contemplating, and have now under consideration, the issuance of a popular health magazine to be patterned after the National Geographic Magazine, which you men have all seen, and whose popularity has been attested by the tremendous circulation it has attained. We believe that the time is ripe when we have got to carry on this gospel of personal hygiene everywhere, make use of the press, see to it that every individual and not merely the elect shall become acquainted with the rudiments of personal hygiene, and that a common knowledge shall be obtained everywhere of public health conditions. We are assuming to complement and supplement the work done by State boards of health and other health organizations, in obtaining proper appropriations for their work, in obtaining full time health officers and arranging for courses of instruction for health officers, the men in the small communities who have no opportunity to obtain this knowledge, giving them standardized literature, furnishing them standardized forms which they can use and which they are unable probably to provide for themselves.

We are attempting to go one step further and to organize in every State in this union a state public health association. Already seven or eight of these have recently come into existence. They are to be made up, not merely of health officials, but of laymen, and the purpose of them is to carry this thought of popular health education to every member of the community, through the organization of the State Health Association.

450 Twenty-Ninth Annual Meeting

We are deeply interested in legislation of all kinds. I was in Washington on Tuesday in connection with a bill for the establishment of Maternity Aid Boards in every State in the union in coöperation with the Federal Government. The United States Public Health Service has a bill in Congress in which it is deeply interested, for a similar appropriation on the part of the Federal Government to carry out a very distinctly new program of rural hygiene and rural sanitation in all the States of the union. They are very desirous of getting this legislation passed, and we are hoping that through the instrumentality of the American Public Health Association we can bring sufficient pressure to bear upon the members of congress to secure the passage of the bill.

In other words, here is the great health organization of the United States, attempting to do a very distinctively constructive piece of work and yet on the other hand, it is known that there are to-day in the United States, as Dr. Vincent pointed out in Chicago, fifty-seven varieties of health societies in the country, working independently, without coördination, without coöperation. Under the direction of the American Public Health Association, a conference is to be called in the very near future, in the hope of trying to bring these fifty-seven varieties together, trying to eliminate the unnecessary ones, to coördinate those that can be coördinated, and to bring about better team work among them, meaning one thing only, better health, better efficiency, better organization.

Now the organization has the men, it has the program, it has the desire to go ahead and accomplish things. It needs one thing only and that need is of a kind without which very little can be accomplished. It needs money. It has no funds. It cannot get funds from its members—its members are health officers, all of them on small salaries, many of them on altogether insufficient salaries. They are willing to do the work, and they are doing the work for you and for me; they are helping us in the work we are doing as insurance men, and therefore this organization comes before you and says to the Insurance Companies of the United States, "Come on and

work with us, and out of the funds you have, out of the monies that are given to you by the people whom you are insuring, the very people for whom we are working in our communities by the reduction of mortality, whose lives we are extending and saving, whose health we are protecting, whom we are keeping from sickness to the extent of our power, we ask you to give us a small part, so that this Association may build up a piece of machinery adequate for the occasion, and in line with modern progress in the things that ought to be done, in the days that are to come."

The health program of the United States is in its infancy, almost in its incipency. The great things that are to be done must be done in the near future. Two million men are coming back to the United States and you are going to face entirely new health problems, in all probability, and I say to you therefore, and particularly as Medical Directors, men who in the last analysis must influence the other officers of your respective companies, men to whom they look for guidance and advice in these matters, we ask you to present to your officials the needs of this organization and the desirability and advisability of becoming corporate members of the American Public Health Association. This campaign was started last year and met with a considerable measure of success, and as a result there are at present in the Association the following Insurance Companies as corporate members:

The Prudential, contributing.....	\$1,000
Metropolitan.....	1,000
Mutual.....	500
Columbian National.....	250
New England Mutual.....	250
Travellers'.....	250
Union Central.....	150
Equitable.....	465
Fidelity Mutual.....	100
Penn Mutual.....	200
National Life.....	150
Pacific Mutual.....	150
Confederation Life.....	100

452 Twenty-Ninth Annual Meeting

Sun Life.....	\$100
Canada Life.....	100
Policyholders' Mutual.....	50
North American Life.....	50

Now the result of that has been that for the first time in its history the Association is this year out of debt, and has for the first time in its history a small surplus. This is all being used to extend the machinery. We do not begin to have a budget sufficiently large for our purposes. Last year, we had a budget of somewhat less than \$25,000 per annum. We ought to have a budget of at least \$50,000 a year. We want to engage a field secretary whom we can send out into the country to meet with health officers, to tell them of the purposes of this organization, to advise with them, counsel with them, to instruct them, particularly the health officer in the small city, to show him the way he ought to go, to bring him the knowledge he should possess, of the bigger things in health and in medicine, so that he may be in his community an inspirational note in trying to make his community live up to modern standards of health and of life conservation.

We do not feel that we are asking too much in this direction. We feel that we are warranted by reason of what this organization is doing, what it is attempting to do at this moment in connection with the influenza situation. I hope that all of you have received copies of the program recently issued as a result of the Chicago meeting. At that conference there were 2000 health officers present. Unfortunately, from the standpoint of cause we know nothing—less than we did, apparently, two months ago. When in Washington on Tuesday, I met with representatives of the United States Public Health Service, and asked what was new in influenza. They shrugged their shoulders and practically said that, if anything, they knew less than two months ago. Notwithstanding, it is the men of this Association, the bacteriologists, the sanitarium and the laboratory men who are doing the work at present in the hope that in the near future we shall have a knowledge of what is the underlying cause of this epidemic, and what we have to expect, and

if anything is to be accomplished, if we are going to make progress, if we are going to find out what will save the company's claims, it is to be done through the American Public Health Association. The need of it is only too apparent. I do not need to tell you what has happened during the last few months. You know it as well as I do, what you have suffered, what enormous drains it has made upon your finances. But what about the future? To me the future is almost as black as the past. I took occasion some weeks ago to prepare certain graphs showing what happened immediately after the epidemic of 1889 and 1890, and these graphs bring out very conclusively, not only from the industrial experience of the Metropolitan, but from the actual experience of the cities of New York, Philadelphia, Chicago, and Boston, based on their population mortality, that for a period of four years subsequent to the epidemic of 1889 and 1890, as late as in 1895, in certain cities, the general mortality continued exceptionally high. The graphs were almost alike for each of the cities. The highest rate, for example, was in the year 1891, in New York City and Chicago, and in the city of Boston it was as late as 1892, practically two years after the presumed ending of the epidemic. And what is true of the general death rate is even more true of the pneumonia death rate. In other words, there are indications that the after effects of pneumonia are equally as bad as the disease itself, that complications arise in conditions of the heart, lungs, kidneys, that make for lower vitality and lower resistance, with eventually a correspondingly high death rate.

Now those are the things that we as insurance men are facing, and I say that if anything is to be accomplished to obviate this situation and overcome this condition, it will be done through the work of the men who are connected with the American Public Health Association and through the activities of this Association.

I think, gentlemen, there is a splendid opportunity here for Insurance Companies to show appreciation of what has been done in the past through the instrumentality of the American

454 Twenty-Ninth Annual Meeting

Public Health Association, and particularly to come in line in a sympathetic and coöperative spirit, to work with the Association. We are desirous of having insurance men represented in the Association, particularly the Medical Directors. If I thought there was any likelihood of it whatever, I would suggest that you hold your meetings in connection with the meetings of the American Public Health Association. I am sure that the men of that Association would very much profit by your deliberations; I even have a suspicion that you might profit by meeting the men connected with the American Public Health Association, because your interests are the same as ours. Your interests are not merely to pay death claims—that is primarily of course the function of the Insurance Company, but I think that you men will agree with me that whatever may be the amount of the claims you pay, all of you would rather be able to say at the end of the fiscal year, that you have extended the lives of your policyholders one year than that you have paid all the claims; and that, after all, is the province of the Insurance Company. Our purpose in life has got to be to make men live longer, and not merely to pay death claims; and for that reason, since the Insurance Companies have until today taken practically no interest in this work and have done very little, directly or indirectly, to make life longer, the time is now ripe, and the opportunity at hand for the coöperation we ask for, and I would ask you gentlemen, as you represent your companies, that you go home and bring this matter to the notice of your officials in the hope that those companies that are not as yet members of this Association may come along and give us the sinews of war, and enable us to do the things we are attempting to accomplish. I thank you very much.

Dr. Jaquith—I am sure we are very grateful to Dr. Frankel, and he tells me that he is prepared to answer any questions you may care to ask.

Dr. King—I want to express to Dr. Frankel my appreciation of his very interesting address, and to make the suggestion

that he invite himself to the next meeting of the Association of Life Insurance Presidents. They are the men that hold the bag, and they are the men who would be just as much interested in hearing this discussion as we have been, and that is the place to present it as forcibly as he has presented it here to-day.

Dr. Frankel—May I through you, Mr. Chairman, answer Dr. King, by saying that at the meeting of the Life Insurance Presidents, held in January, 1918, this matter was presented by the then President of the Association, Dr. Hastings, of Toronto, and that a resolution was passed at that time, recommending that every company belonging to the Life Insurance Presidents' Association become affiliated with the American Public Health Association. That was very good as far as it went, but we find that when we have approached the companies individually, the general statement has been made, that "we will take this up with our Medical Directors." In other words, that while they held the purse strings, the men they go to for advice are the Medical Directors, and therefore we believe that you are the ones that can induce your companies to become associated with us.

Dr. King—I am going to make the suggestion that every member of this Association become a member of the Public Health Association and identify himself with its work. We are spread all over the United States, and each one of us has a certain amount of influence in the community in which he lives, by the mere fact of the position he occupies. We may not think ourselves of much importance, but the community thinks otherwise, and I have found of recent years that even a man of comparatively small importance can do some work in that line. I became interested a short time ago in matters associated with the public health, and I began writing at the invitation of the local editor, a few articles on various topics of interest to the community, pointing out things that most people do that they should not do, in other words, criticizing the ordinary mode of life of the individual. I found that a great interest was taken in those articles, so much so, that the

456 **Twenty-Ninth Annual Meeting**

local ministers took them up and used them as texts in their talks to young people. I think if we all devoted a little of our spare time to making propaganda of that character, even though it were not original, it would do a great deal of good in the community, and so far as we are concerned as Medical Directors, I think we all ought to join the Association and do as much as we can to influence the offices with which we are connected to become interested in the work.

Dr. Rockwell—I should like to ask Dr. Frankel if he thinks it would be well to submit to each Medical Director a list of the amounts that have already been subscribed by the various companies and the names of the companies that are contributing.

Dr. Frankel—I should be very glad to send that list, if you will give me a list of your membership.

Dr. King—Along that line, it seems to me that if someone drew a list of contributions that might fairly be expected of the various companies, based on their insured lives, it might be helpful. If the Equitable or the Metropolitan contributes \$1000, it would hardly be fair to expect a much smaller company to contribute anything like that amount, but there ought to be some sort of scale by which the various companies could measure themselves.

Might I also suggest that President Frankel send a membership blank to each member of this Association?

The tellers announced the result of balloting for the election of officers, as follows:

PRESIDENT

DR. THOMAS H. ROCKWELL

FIRST VICE-PRESIDENT

DR. FANEUIL S. WEISSE

SECOND VICE-PRESIDENT

DR. AUGUSTUS S. KNIGHT

Election of Officers

457

SECRETARY

DR. ANGIER B. HOBBS

TREASURER

DR. CHARLES L. CHRISTIERNIN

EDITOR OF THE PROCEEDINGS

DR. ROBERT M. DALEY

EXECUTIVE COUNCIL

DR. EDWIN W. DWIGHT

DR. GEORGE A. VAN WAGENEN

DR. ROBERT L. ROWLEY

It was moved by Dr. Weisse and seconded by Dr. Knight that we extend a vote of thanks on behalf of the Association to the officers of the Prudential Insurance Company for their most courteous and cordial hospitality to the members of the Association during the meeting.

Motion carried by a rising vote.

Dr. Jaquith—Gentlemen: It has been a delight to have all of you with us and personally I feel that this meeting could not have been the success it has been, were it not for the very generous support which the members of the Association have given it. Before adjourning, I would like again to introduce President-Elect Rockwell.

Dr. Rockwell—Mr. President: I think you have heard enough from me in the last two days. I do appreciate very deeply the honor which has been done my company in selecting me as your representative for another year, and I can only express the wish and the hope that next year's meeting will in some way approximate the usefulness and delightfulness of

458 Twenty-Ninth Annual Meeting

this occasion. It is a very high mark to hit. We will try to do so, but we must confess to fears that we will not be able to accomplish it. We are all greatly indebted to our retiring President for the manner in which he has conducted this meeting, the time he has given to preparation for it, and the many tasks which are incident to the work of the President, which he now so well knows and which are still for me to learn.

On motion, the meeting adjourned, *sine die*.

The Annual Dinner of the Association was held on the evening of Wednesday, January 29th, at the Robert Treat Hotel, Newark. The following members were present at the dinner:

J. L. Adams, H. B. Anderson, C. D. Bennett, C. T. Brown, L. D. Chapin, C. L. Christiernin, C. P. Clark, R. M. Daley, P. G. Drake, O. M. Eakins, Z. T. Emery, W. G. Exton, R. A. Fraser, A. H. Gordon, F. L. Grosvenor, G. C. Hall, A. B. Hobbs, W. G. Hutchinson, W. A. Jaquith, G. E. Kanouse, A. S. Knight, W. W. Knight, W. P. Lamb, R. L. Lounsberry, L. F. MacKenzie, O. F. Maxon, S. W. Means, H. A. Pardee, J. A. Patton, W. O. Pauli, J. S. Phelps, J. E. Pollard, W. E. Porter, A. T. Post, F. P. Righter, T. H. Rockwell, O. H. Rogers, E. K. Root, R. L. Rowley, E. F. Russell, S. B. Scholz, Jr., Morton Snow, H. B. Speer, Harry Toulmin, J. D. Turner, W. R. Ward, W. P. Watson, J. H. Webb, W. H. Wehner, F. S. Weisse, F. C. Wells, C. D. Wheeler, T. H. Willard, Archibald Mercer.

